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Radiography as an Aid to Dose-Control in the Radium Treatment of the Cervix

BY

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RADIOTHERAPY of cancer demands that the whole of the tumour-bearing tissue be irradiated with an adequate dose. When radium is being applied locally to the growth, notice should be taken of the fact that the intensity of radiation falls off very rapidly with increase in distance from each individual component of the radium assembly. The radium must, therefore, be arranged with precision if an adequate irradiation of the outlying parts of the tumour is to be achieved without causing damage to the tissues near the radium.

The mechanical flexibility of the radium applicators used in the "Stockholm" type of treatment of cancer of the cervix allows easy adjustment to the configuration of any individual case; but at the same time this variation of the arrangement from case to case also produces considerable variations in the distribution of the physical dose. It is, therefore, desirable in the control of the treatment to ascertain in each case the exact arrangement of the radium, and to assess the distribution of radiation.

The following presents the data of some typical cases from a series investigated at St. Mary's Hospital during 1946.

The investigation of the physical dose of radium insertions is based on the use of charts showing the distribution of radiation around the individual sources in use, i.e.: Intrauterine tube containing 2 × 20 mg. Vaginal boxes containing 5 × 5 mg. each.

These charts consist of isodoses, lines linking the points exposed to an equal intensity of radiation from the source. The intensity is expressed in roentgens per hour (r/hr.).

Two points emerge on examining these charts (Fig. 1):

(1) The very rapid decrease of intensity with an increase of the distance from the source, e.g.: Intensity 1 cm. from the vaginal box, 150 r/hr. Intensity 2 cm. from the vaginal box, 40 r/hr.

(2) for distances greater than about 2.5 cm. the isodoses closely follow circles which are centred on the centre of the box. This means that for such distances the

dose is mainly governed by the distance from the centre of the box and is largely independent of any tilt or rotation of the box through its centre.

Fig. 2 represents an arrangement of the radium which has been described as ideal. The scale drawing shows that the vaginal vault must be stretchable to a total width of 7 cm. for this arrangement to be carried out. In practice, the ideal arrangement is very rarely achieved.

The estimation of the dose delivered is obtained by a simple summation of the doses contributed by the individual sources. The total dose (continuous line in the graph) is expressed in r/hr. and the dose in r. is calculated for 3 × 22 hours, which is the standard time for this arrangement. The dose is estimated along two lines extending laterally from the uterine canal at levels 1 cm. and 2.5 cm. above the level of the external os (lines b and a respectively in Fig 2). This permits a better visualization of the dose distribution along the usual path of extension of the growth than if the dose assessment were carried out for 1 or 2 selected points only. The upper plane lies near point "A" of Tod which is described as being situated 2 cm. above the vaginal vault and 2 cm. lateral to midline.

In the Stockholm type of treatment by intermittent application it is reckoned that a total of 6,600 r. given in 3 insertions represents an adequate dose. A dose smaller than 4,500 r. must be regarded as insufficient. The position of these dose-levels in the ideal arrangement is indicated in Fig. 2 and it is seen that the dose falls below 6,600 r. at distances greater than 4 cm. from the midline in the lower plane. The effective reach in this arrangement, therefore, is up to 4 cm. from the midline in the lower plane and only 1.5 cm. from the midline in the upper plane. In these circumstances the tissues 0.5 cm. beyond the wall of the lateral fornix receive a dose of between 10,000 and 14,500 r.

Insufficient width of the vaginal vault or the presence of bulky tumour tissue often prevents the radium application according to the ideal scheme and this arrangement was, therefore, not seen in any of the cases under review.

As the ideal arrangement can rarely be applied it becomes necessary to ascertain the position of the radium in each individual insertion in order to assess the dose given and to guard against a misplacement of the radium. This can be done most conviently by the following radiographic methods.

(*a*) An antero-posterior and a lateral film. These are difficult to interpret because of the overlapping of dense shadows and because of the magnification-distortion inherent in the method.

(*b*) Stereoscopic antero-posterior films. These give a very good general survey of the position of the containers but do not permit an accurate measurement of dimensions unless a mensuration stereoscope is used.

(*c*) In this series a combination of (*a*) and (*b*) is used. For a scale drawing of the insertion in the coronal plane the dimensions of the central antero-posterior film are reduced to a natural size by the following formula:—

$$\text{True dimension} = \text{measured dimension} \times \frac{\text{Total stereo tube-shift (T.T.S.)}}{\text{T.T.S. plus measured image-shift}}$$

An exaggerated total tube-shift (20 cm.) is employed so that the image-shift on the films is easily measurable. Films thus obtained still permit stereoscopic visualization as an aid. If wanted, an actual model-reconstruction of the implant can be made from the shift-films by means of foreign-body localization methods.

A fairly common arrangement is seen

in Fig. 3. The dose-data of an insertion of this type are given in Fig. 4. This type of insertion requires a total vaginal width of 5 cm. but the whole implant is much less efficient than the ideal type because of the crowding of the radium and the lower position of the centres of the lateral boxes. The fall off of the dose in the periphery is more rapid than in the ideal version. The effective reach as represented by the 6,600 r. dose level is reduced from 4 cm. to 2.75 cm. in the lower plane in spite of an increase of the total time to 3 times 24 hours. The zone of effective irradiation in the upper plane is very little different from that in the ideal arrangement. This increase in the insertion time causes the normal tissues near the applicators to receive a correspondingly higher dose. The estimated dose at a point ½ cm. beyond the wall of the lateral fornix is now 16,500 r. as against a maximum of 14,500 r. in the ideal case. This is almost as high a dose as normal tissues can stand.

An alternative arrangement for a vaginal width similar to that in the foregoing case is presented in Fig. 5. The dose assessment of an insertion of this type is given in Fig. 6. The total amount of radium is reduced by the elimination of the centre box. This allows the remaining boxes to be positioned in a more satisfactory manner. The time of insertion, however, is increased to 3 × 28 hours. Although the effective reach is similar to that in the foregoing case there is a greater safety factor in this arrangement. This is seen by the fact that the normal tissues at a point ½ cm. beyond the wall of the lateral fornix receive a total dose of 14,000 r. as against 16,500 r. in the position illustrated in Fig. 4.

Another type of insertion is seen in Fig. 8, and the physical dose for 3 insertions of this type of 24 hours each is represented in Fig. 7.

The dose at a point ½ cm. beyond the wall of the lateral fornix is 15,000 r. The zone of effective irradiation extends to 3 cm. beyond the midline along the lower plane.

This type of insertion is preferable to both the previous ones but it requires 0.8 cm. additional space for the reception of the vertically positioned centre box. It is difficult to keep this vertical box in position and to keep the rectum packed well away from it. The use of a cylindrical applicator containing 5 mg. tubes instead of the vertically placed centre box would represent a mechanical advantage.

The type or arrangement often differs in successive insertions in the same case, especially as there is a tendency for the vaginal vault to contract in the interval between the insertions. Figs. 8, 9 and 10 show 3 consecutive insertions in a case and the corresponding dose charts are given in Figs. 8a, 9a, and 10a. It can be seen that the first insertion was the most satisfactory, having an effective reach of nearly 3 cm. on the left side. The uterine-tilt away from the right reduced the effective reach on the right to 2.5 cm. (Fig. 8a). It was not possible to place the radium in the same position during the next 2 insertions on account of contraction of the vaginal vault, and it can be seen from the charts (Figs. 9a and 10a) that the effective reach of the last 2 insertions is reduced by nearly 1 cm. on the left and by ½ cm. on the right as compared with the first insertion (Fig. 8a). The total dose from all 3 insertions is given in Fig. 11 which shows that an effective reach of the whole treatment is 2.4 cm. to the left and 2.3 cm. to the right.

Sometimes the radium insertion is grossly asymmetrical because of distortion of the pelvic structure due to the growth. A case of this type is illustrated in Fig. 12. The corresponding dose-data are given in Fig. 13 and Fig. 13a. Here the infiltrated

and shortened left parametrium has pulled the top of the vagina and the lower end of the uterus over towards the left lateral pelvic wall. The structures are not only displaced but also angulated. The lateral angulation between uterus and vagina was observed in all 3 insertions.

At first sight the deviation of the radium towards the side of the known parametrial spread is welcome, as it suggests an increased irradiation of that region. An analysis of the physical dose, however, shows (Figs. 13 and 13a) that owing to the lateral tilt of the uterus it is the *right* paracervical region which is cross-fired by the radium in the uterus and by the right vaginal box. It is for this reason that the high dose area, although displaced as a whole to the left, extends for 3.5 cm. to the right from the external os but only for 2 cm. to the left of the external os. The area of the left parametrial spread in this case is, therefore, not adequately irradiated.

Radiographic control of radium insertions will also demonstrate the presence and the degree of retroversion of the uterus. The recognition of this condition is important, as the proximity of the intrauterine radium to the rectal wall in retroversions is one of the causes of irradiation damage to the rectum. The degree of retroversion may not be constant. This is illustrated in Figs. 14 and 15, showing the radium arrangement of the first and third insertion in the same patient.

Frank malpositions of the radium are obvious in the radiographs and the lateral film is especially valuable in showing at a glance whether the boxes are retained well up in the fornices (Fig. 16) or whether they have slipped down into the vagina (Fig. 17).

An estimation of the dose delivered by the radium taken together with the clinical extent of the growth will show whether or not the treatment has been physically adequate. Additional irradiation seems indicated where either the tumour is known to extend outside the effectively irridiated volume or where such an extension must be suspected because of the anaplastic nature of the tumour.

It is clear from the foregoing analyses that the Stockholm method can rarely be relied upon to reach tumour tissue situated further than 3 cm. on either side of the midline, so that nearly all Stage II and all Stage III cases need supplementary treatment on physical grounds alone.

Supplementary treatment is usually given by X-radiation and has to be planned for each case so that no undesirable additional irradiation is given to the area already effectively treated by the radium irradiation. It is possible to plan the application of the supplementary X-radiation in such a way that the X-ray dose increases progressively as the radium-dose decreases from the centre of the pelvis towards the lateral pelvic wall. Fig. 18 illustrates this method as applied to an average case. This shows that 6 fields are used and that a pelvic dose of 30 r. in the midline, rising to 90 r. at the pelvic wall is given for each 100 r. applied to each of the 6 fields.

The quantitative assessment of the combined radium and X-ray treatment is difficult in this instance because the optimum physical dose of the radium treatment is 6,600 r. given in 3 insertions, whereas the optimum dose for pelvic irradiation of this type with X-rays seems to be in the order of 2,000 r. given over 4 to $4\frac{1}{2}$ weeks. The roentgen can here no longer be regarded as the common denominator, and it is suggested that the estimation of the combined dose is expressed as percentage of the optimum. Fig. 19 shows the distribution of both the radium and the X-ray dose expressed in these terms. The chart illustrates that the optimum level of irradiation is maintained throughout the

whole width of the pelvis by either radium or X-ray treatment and it shows how the X-ray treatment can take over where the radium dose becomes inefficient. Thus at the upper plane the radium dose falls below optimum level at 1.75 cm. from midline but at the same point the X-ray dose enters the optimum range and this is sustained right out to the lateral pelvic wall.

ACKNOWLEDGMENTS.

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Sandler, B. (1938): *Brit. J. Radiol.*, **11**, 623.
Tod, M. C. (1941): *Brit. J. Radiol.*, **14**, 23.
Tod, M. C., and Meredith, W. J. (1938): *Brit. J. Radiol.*, **11**, 809.

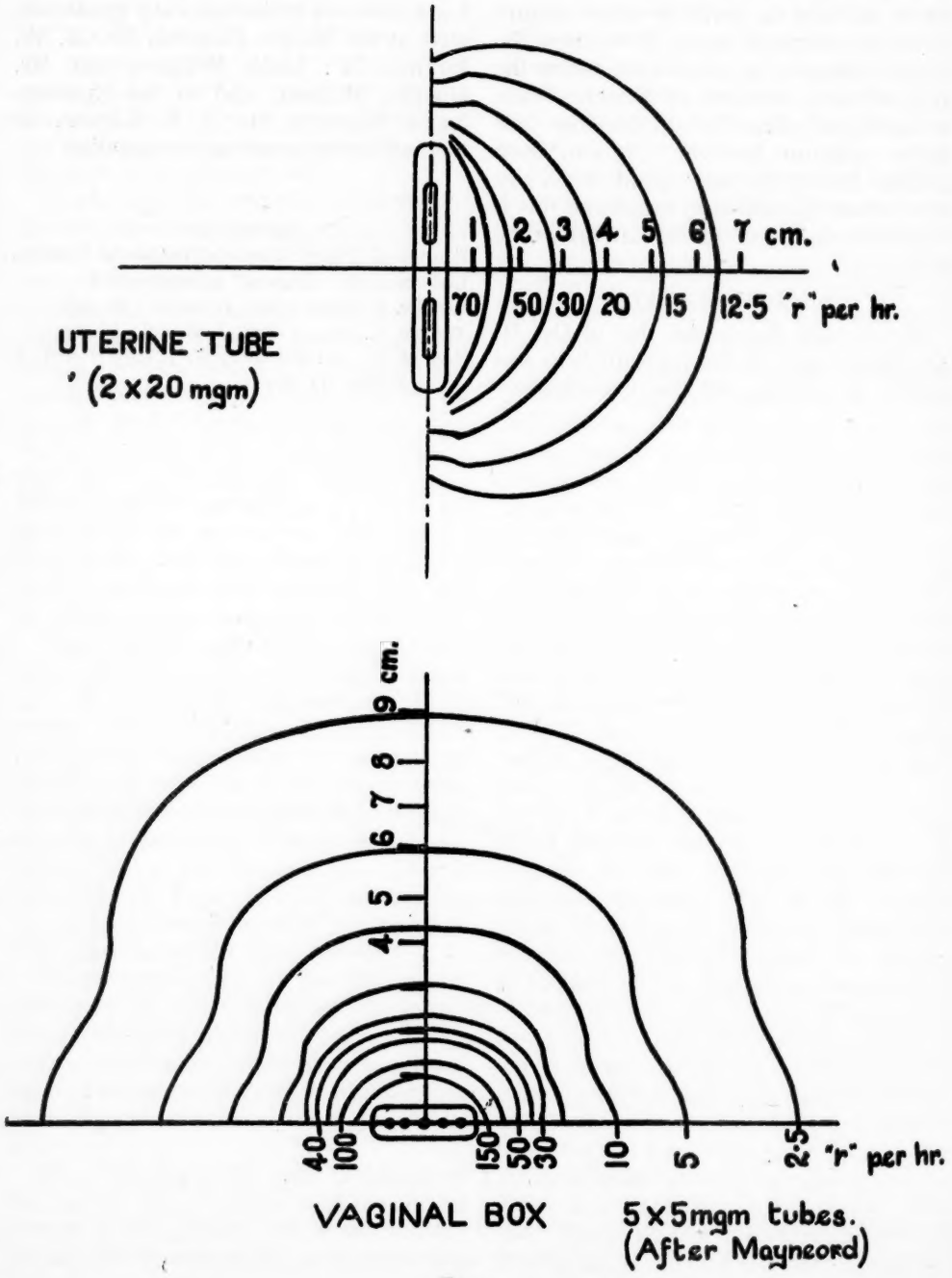

1
2
3
4
5
6
7 cm.
70
50
30
20
15
12·5 "r" per hr.
UTERINE TUBE
(2 x 20 mgm)
9 cm.
8
7
6
5
4
40
100
150
50
30
10
5
2·5 "r" per hr.
VAGINAL BOX
5 x 5 mgm tubes.
(After Mayneord)

FIG. 1.

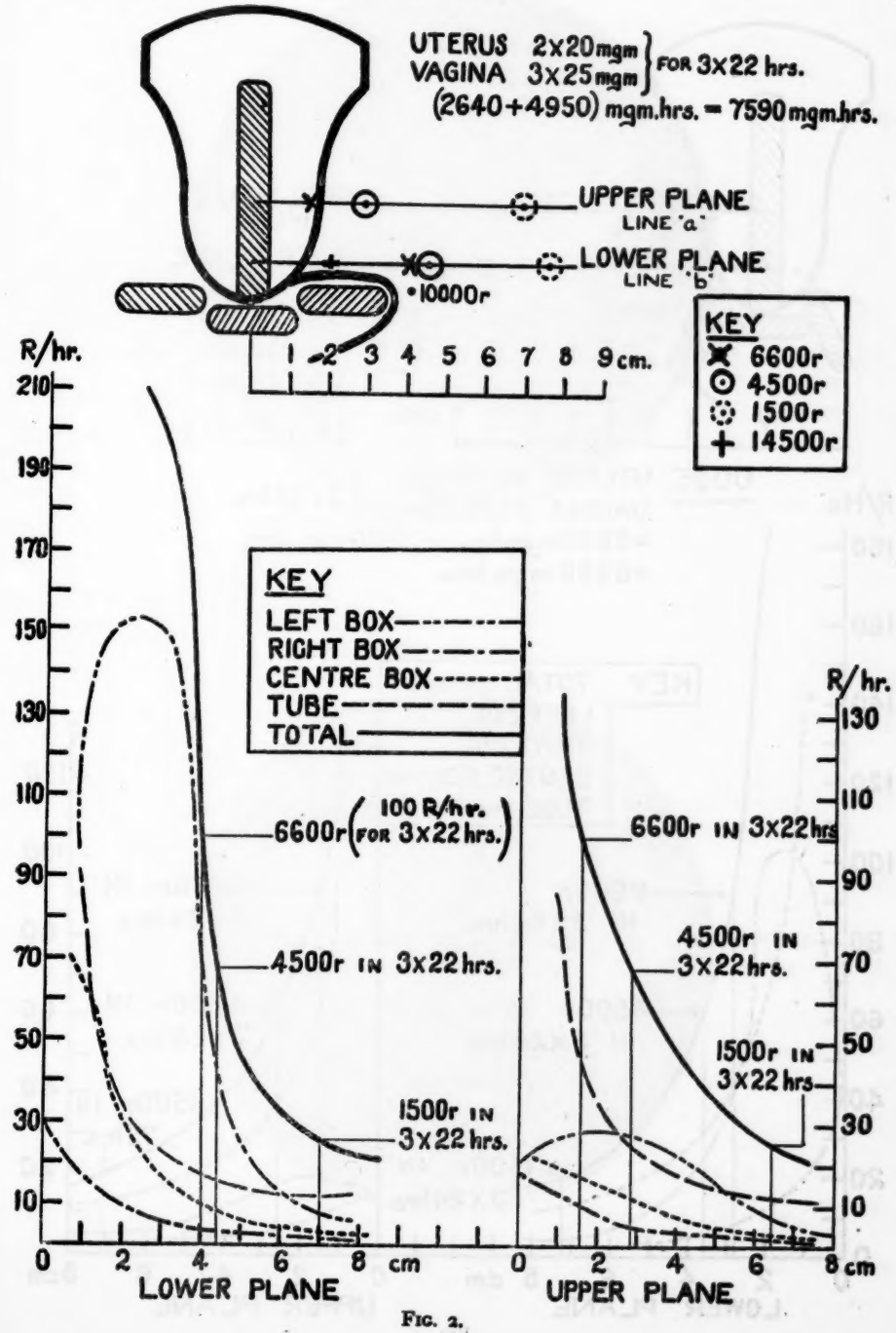

UTERUS 2x20mgm
VAGINA 3x25mgm
FOR 3x22 hrs.
(2640+4950) mgm.hrs. = 7590 mgm.hrs.
UPPER PLANE
LINE 'a'
LOWER PLANE
LINE 'b'
•10000r
1 2 3 4 5 6 7 8 9 cm.
KEY
6600r
4500r
1500r
14500r
R/hr.
210
190
170
150
130
110
90
70
50
30
10
KEY
LEFT BOX
RIGHT BOX
CENTRE BOX
TUBE
TOTAL
100 R/hr. FOR 3x22 hrs.
6600r
4500r IN 3x22 hrs.
1500r IN 3x22 hrs.
0 2 4 6 8 cm
LOWER PLANE
R/hr.
130
110
90
70
50
30
10
6600r IN 3x22hrs
4500r IN 3x22 hrs.
1500r IN 3x22 hrs
0 2 4 6 8 cm
UPPER PLANE

FIG. 2.

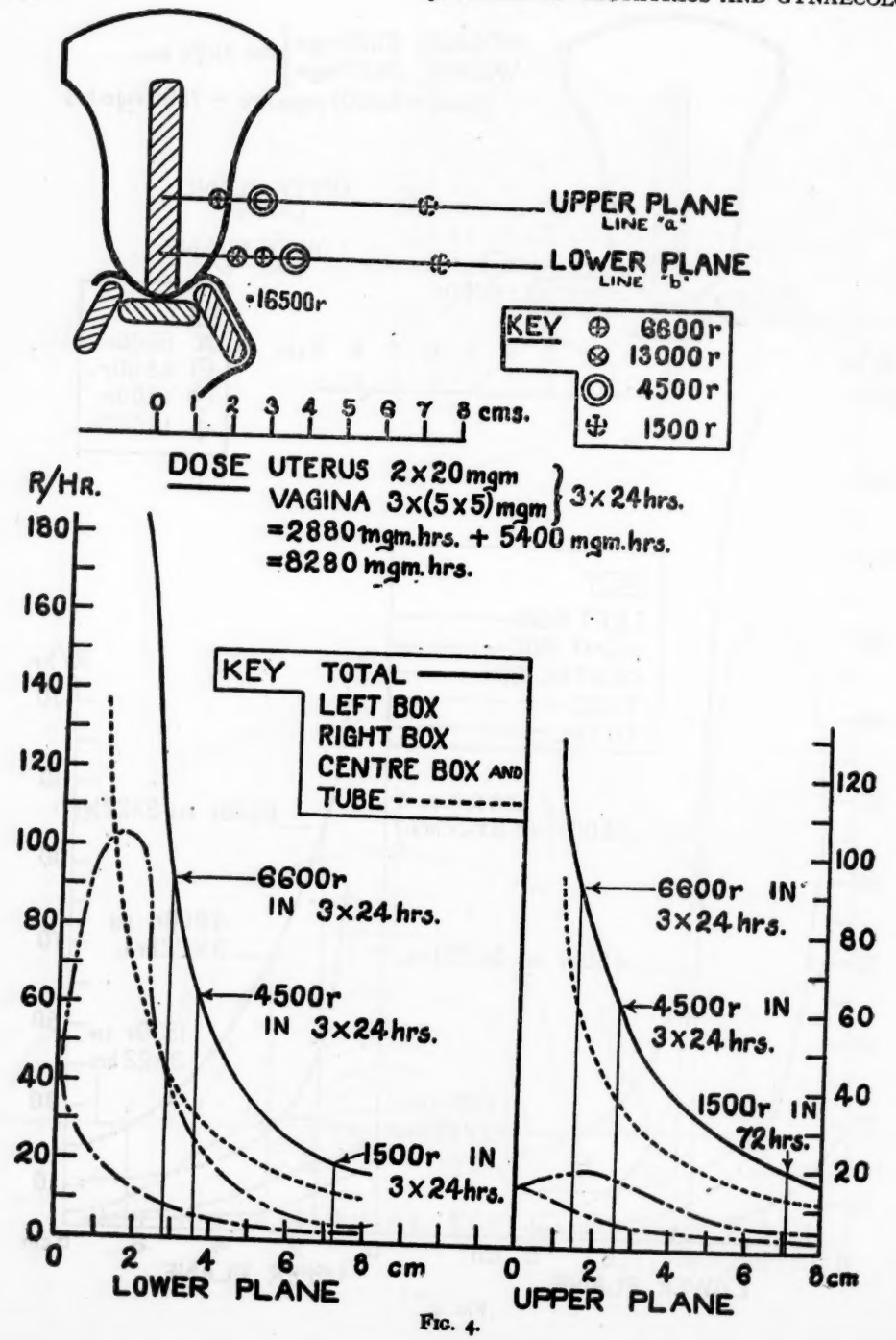

UPPER PLANE
LINE 'a'
LOWER PLANE
LINE 'b'
•16500r
KEY ⊕ 6600r
⊗ 13000r
◎ 4500r
⊕ 1500r
0 1 2 3 4 5 6 7 8 cms.
DOSE UTERUS 2x20mgm
VAGINA 3x(5x5)mgm } 3x24hrs.
=2880mgm.hrs. + 5400 mgm.hrs.
=8280 mgm.hrs.
R/HR.
180
160
140
120
100
80
60
40
20
0
KEY TOTAL
LEFT BOX
RIGHT BOX
CENTRE BOX AND TUBE
6600r IN 3x24hrs.
4500r IN 3x24hrs.
1500r IN 3x24hrs.
6600r IN 3x24hrs.
4500r IN 3x24hrs.
1500r IN 72hrs.
0 2 4 6 8 cm
LOWER PLANE
0 2 4 6 8cm
UPPER PLANE

FIG. 4.

FIG. 3.

FIG. 5.

FIG. 8.

FIG. 9.

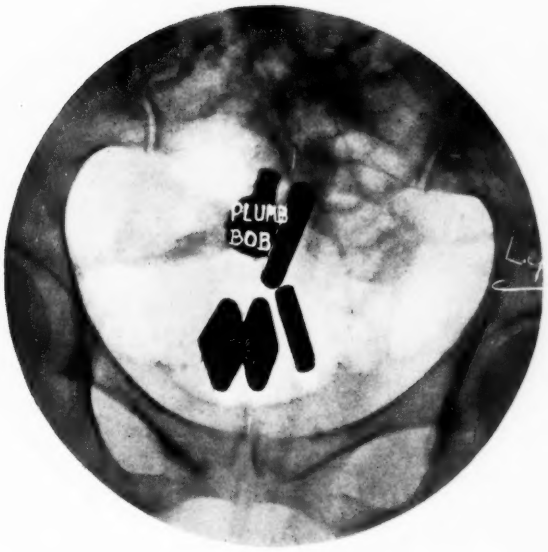


FIG. 10.

FIG. 12.

FIG. 14.

FIG. 15.

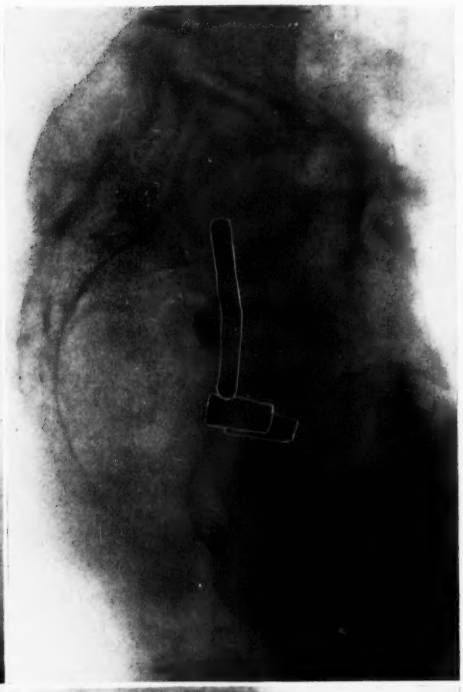


FIG. 16.

FIG. 17.

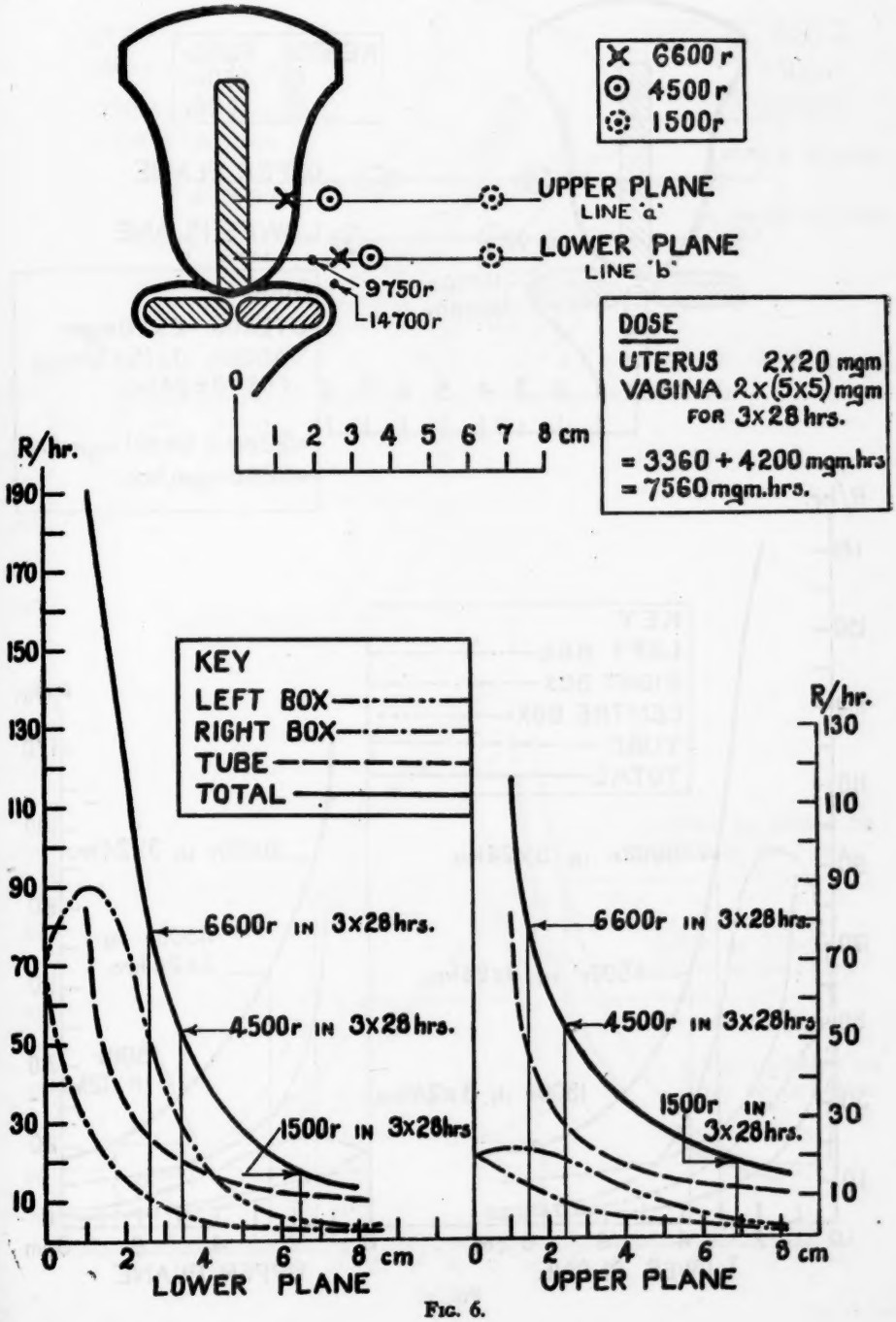

6600r
4500r
1500r
UPPER PLANE
LINE 'a'
LOWER PLANE
LINE 'b'
9750r
14700r
0 1 2 3 4 5 6 7 8 cm
DOSE
UTERUS 2x20 mgm
VAGINA 2x(5x5) mgm
FOR 3x28 hrs.
= 3360 + 4200 mgm.hrs
= 7560 mgm.hrs.
R/hr.
190
170
150
130
110
90
70
50
30
10
KEY
LEFT BOX
RIGHT BOX
TUBE
TOTAL
6600r IN 3x28hrs.
4500r IN 3x28hrs.
1500r IN 3x28hrs
0 2 4 6 8 cm
LOWER PLANE
R/hr.
130
110
90
70
50
30
10
6600r IN 3x28hrs.
4500r IN 3x28hrs
1500r IN 3x28hrs.
0 2 4 6 8 cm
UPPER PLANE

FIG. 6.

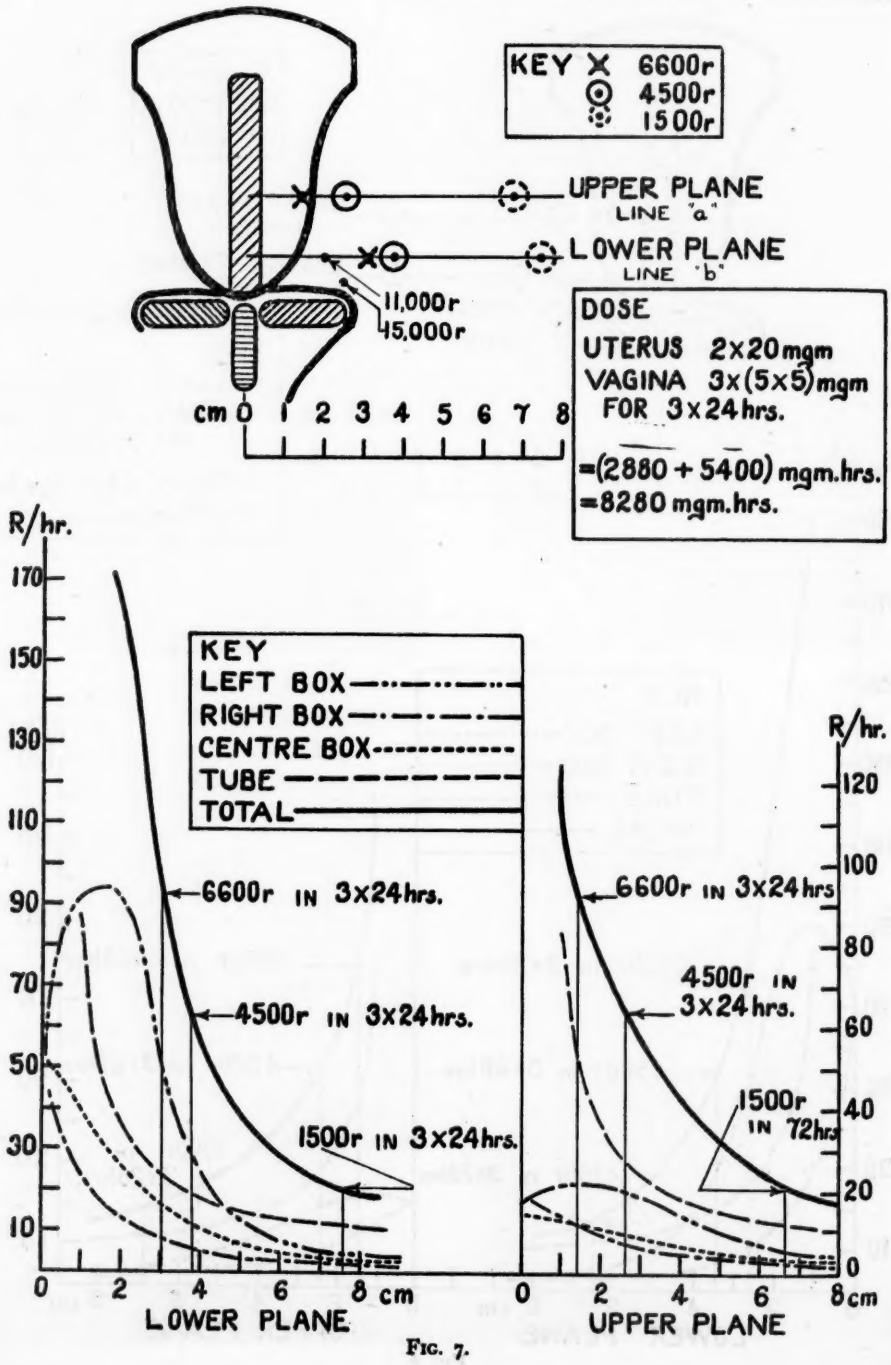

KEY 6600r
4500r
1500r
UPPER PLANE
LINE 'a'
LOWER PLANE
LINE 'b'
11,000r
15,000r
cm 0 1 2 3 4 5 6 7 8
DOSE
UTERUS 2x20mgm
VAGINA 3x(5x5)mgm
FOR 3x24hrs.
=(2880 + 5400) mgm.hrs.
=8280 mgm.hrs.
R/hr.
170
150
130
110
90
70
50
30
10
KEY
LEFT BOX
RIGHT BOX
CENTRE BOX
TUBE
TOTAL
6600r IN 3x24hrs.
4500r IN 3x24hrs.
1500r IN 3x24hrs.
0 2 4 6 8 cm
LOWER PLANE
R/hr.
120
100
80
60
40
20
0
6600r IN 3x24hrs
4500r IN 3x24hrs.
1500r IN 72hrs
0 2 4 6 8cm
UPPER PLANE

FIG. 7.

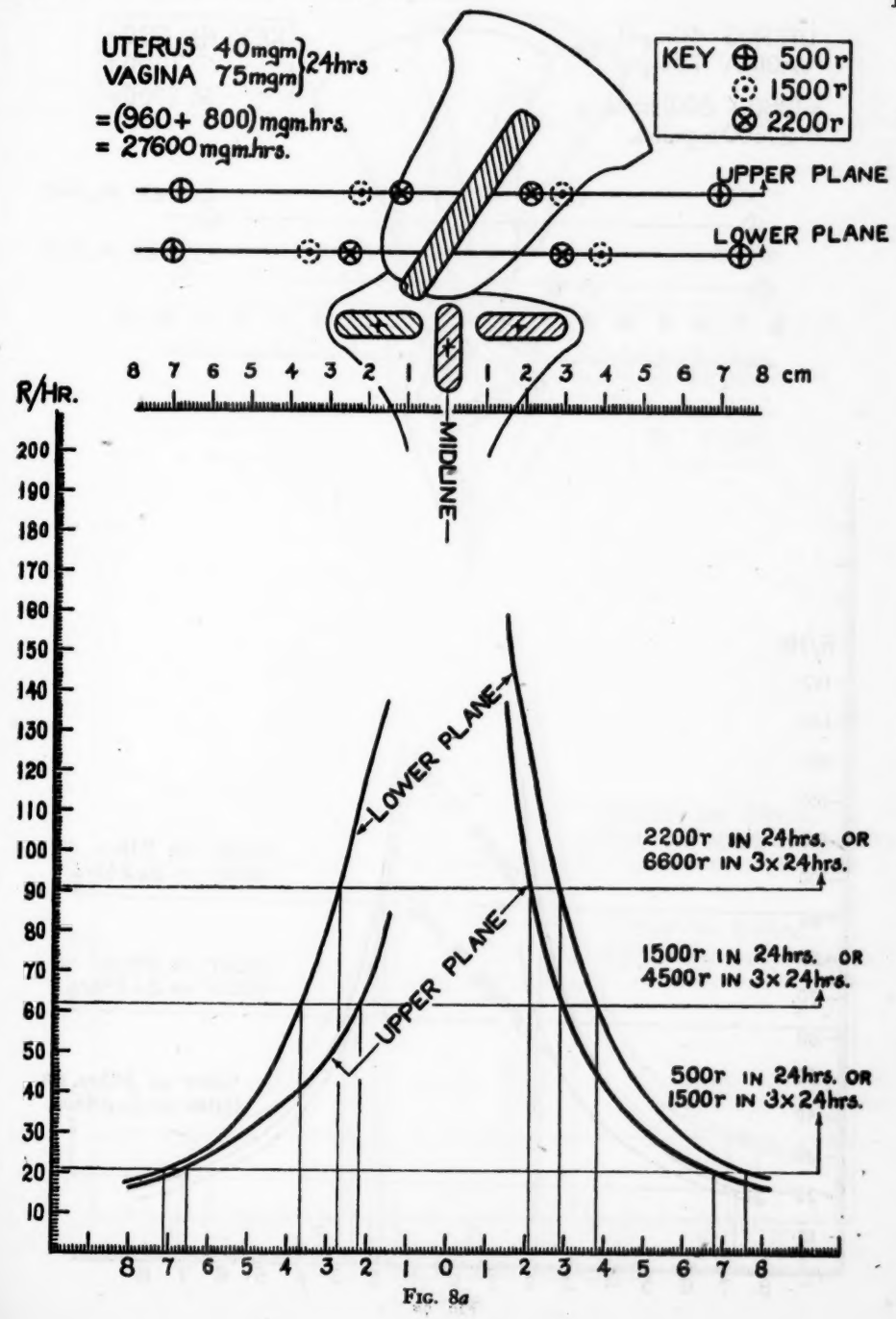

UTERUS 40mgm } 24hrs
VAGINA 75mgm }
=(960+ 800)mgm.hrs.
= 27600mgm.hrs.
KEY ⊕ 500r
⊙ 1500r
⊗ 2200r
UPPER PLANE
LOWER PLANE
8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8 cm
MIDLINE
R/HR.
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
LOWER PLANE
UPPER PLANE
2200r IN 24hrs. OR
6600r IN 3x24hrs.
1500r IN 24hrs. OR
4500r IN 3x24hrs.
500r IN 24hrs. OR
1500r IN 3x24hrs.
8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8

FIG. 8a

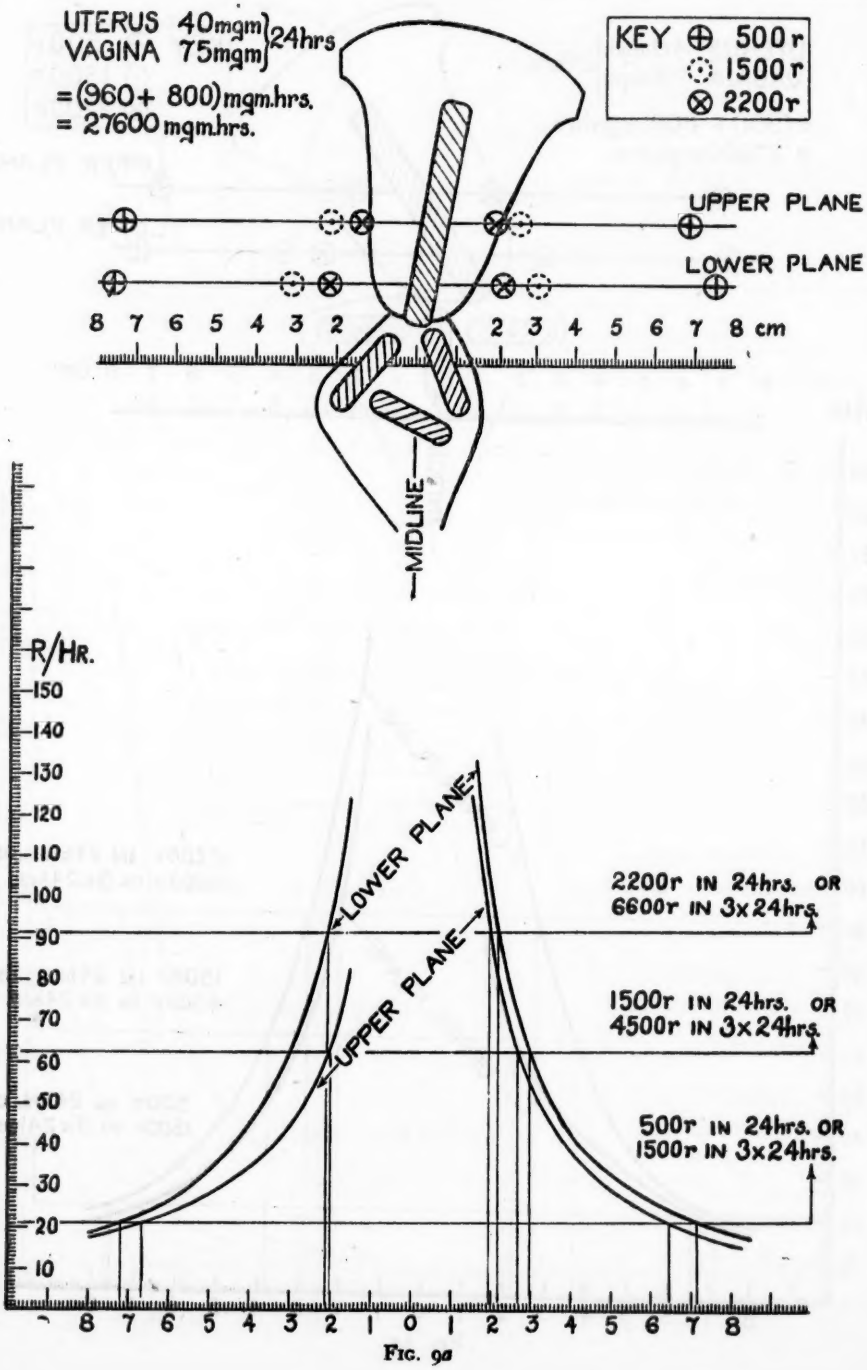
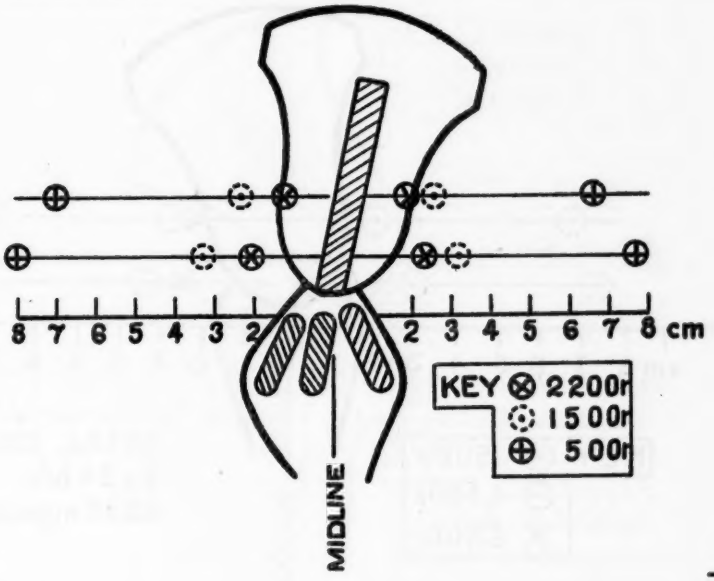

UTERUS 40mgm
VAGINA 75mgm 24hrs
=(960+ 800)mgm.hrs.
= 27600 mgm.hrs.
KEY ⊕ 500r
⊙ 1500r
⊗ 2200r
UPPER PLANE
LOWER PLANE
8 7 6 5 4 3 2 2 3 4 5 6 7 8 cm
MIDLINE
R/HR.
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
LOWER PLANE
UPPER PLANE
2200r IN 24hrs. OR
6600r IN 3x24hrs.
1500r IN 24hrs. OR
4500r IN 3x24hrs.
500r IN 24hrs. OR
1500r IN 3x24hrs.
8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8

FIG. 9a


8 7 6 5 4 3 2 2 3 4 5 6 7 8 cm
KEY ⊗ 2200r
⊙ 1500r
⊕ 500r
MIDLINE

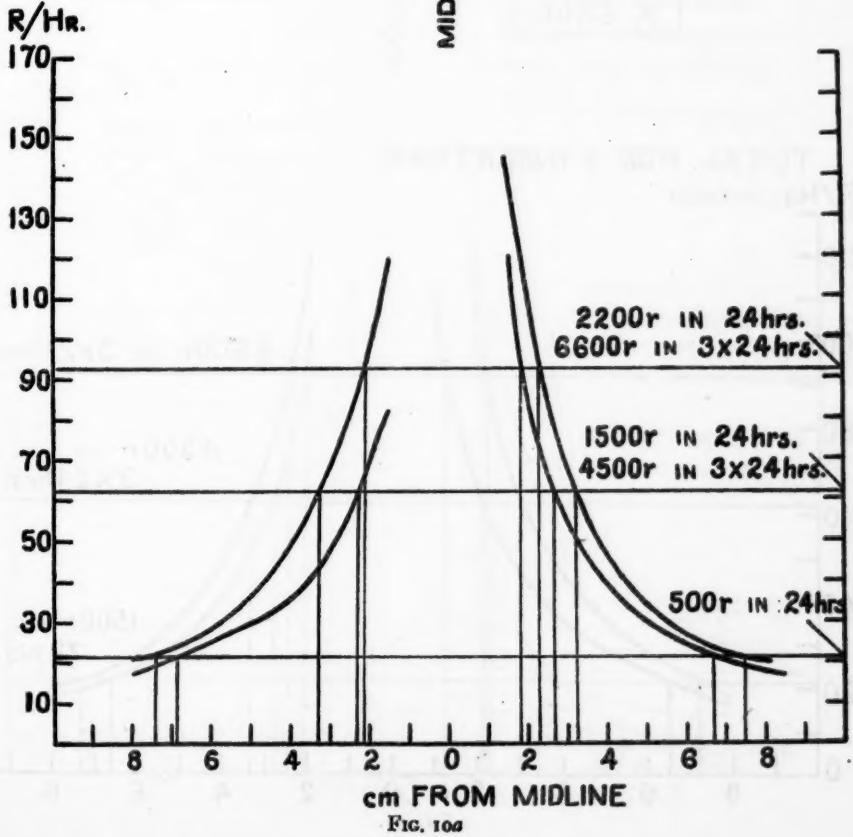
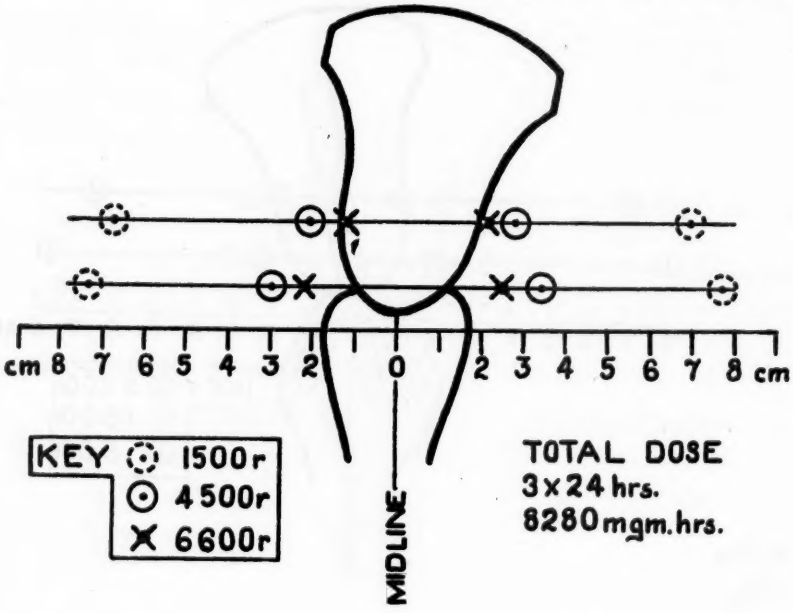

R/Hr.
170
150
130
110
90
70
50
30
10
2200r IN 24hrs.
6600r IN 3x24hrs.
1500r IN 24hrs.
4500r IN 3x24hrs.
500r IN 24hrs
8 6 4 2 0 2 4 6 8
cm FROM MIDLINE

FIG. 10a


cm 8 7 6 5 4 3 2 0 2 3 4 5 6 7 8 cm
KEY 1500r
4500r
6600r
MIDLINE
TOTAL DOSE
3x24 hrs.
8280 mgm. hrs.

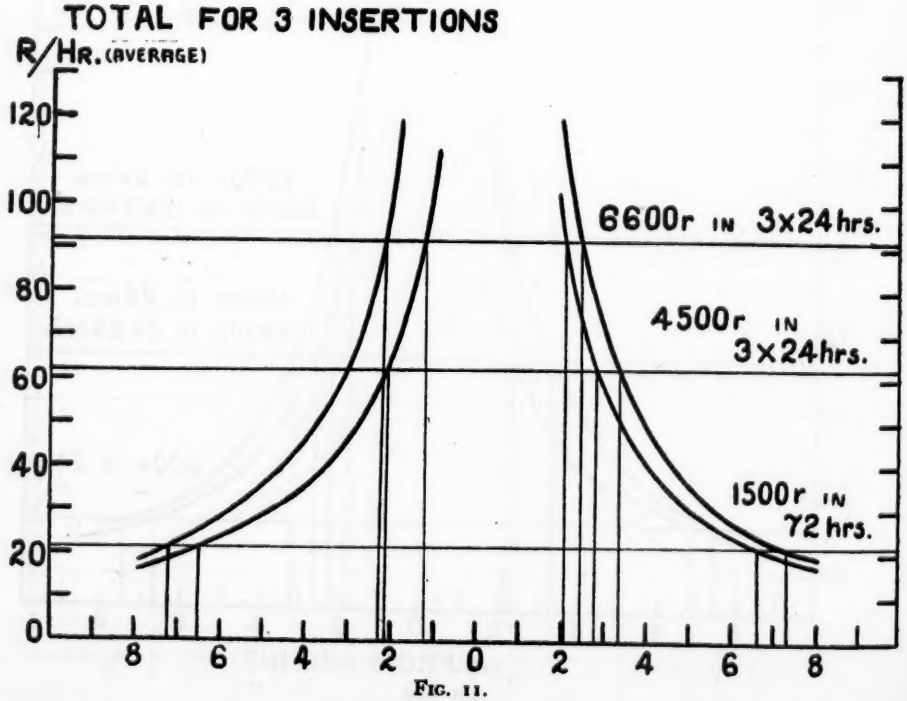

TOTAL FOR 3 INSERTIONS
R/HR. (AVERAGE)
120
100
80
60
40
20
0
6600r IN 3x24hrs.
4500r IN 3x24hrs.
1500r IN 72 hrs.
8 6 4 2 0 2 4 6 8

FIG. 11.

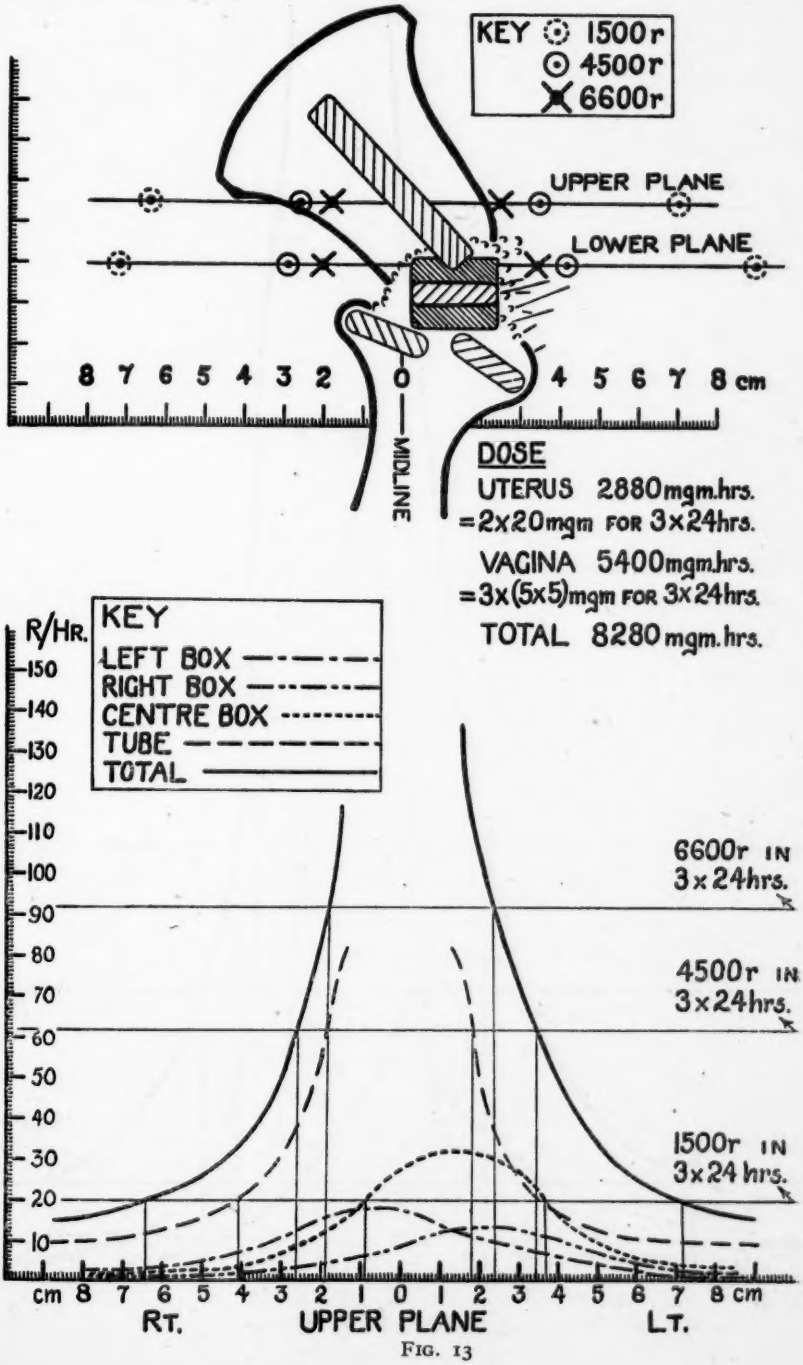

KEY 1500r
4500r
6600r
UPPER PLANE
LOWER PLANE
8 7 6 5 4 3 2 0 4 5 6 7 8 cm
MIDLINE
DOSE
UTERUS 2880mgm.hrs.
=2x20mgm FOR 3x24hrs.
VAGINA 5400mgm.hrs.
=3x(5x5)mgm FOR 3x24hrs.
TOTAL 8280 mgm.hrs.
R/HR.
KEY
LEFT BOX
RIGHT BOX
CENTRE BOX
TUBE
TOTAL
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
6600r IN 3x24hrs.
4500r IN 3x24hrs.
1500r IN 3x24 hrs.
cm 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 cm
RT.
UPPER PLANE
LT.

FIG. 13

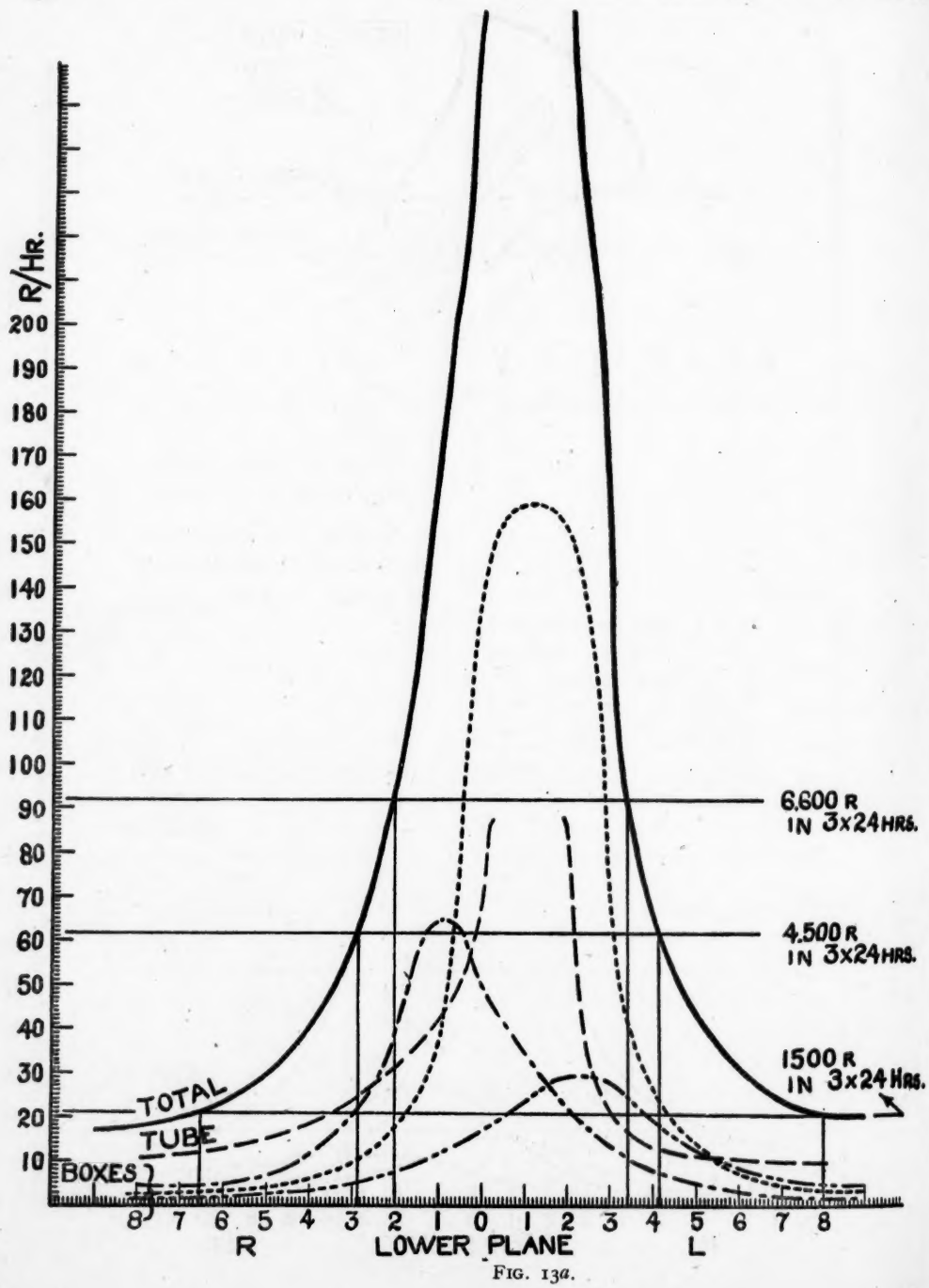
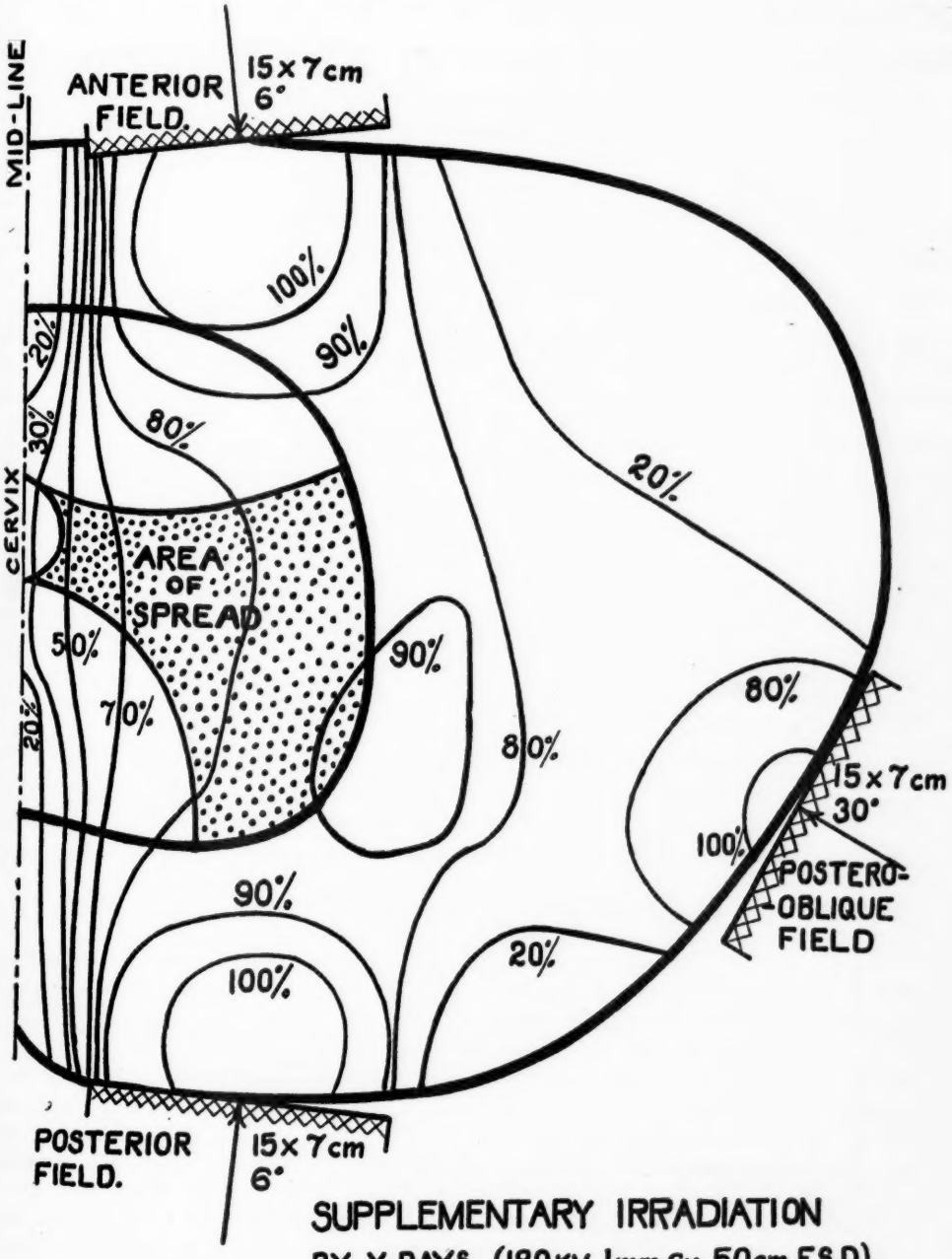

R/HR.
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
6,600 R IN 3x24 HRS.
4,500 R IN 3x24 HRS.
1500 R IN 3x24 HRS.
TOTAL
TUBE
BOXES
8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8
R
LOWER PLANE
L

FIG. 13*a*.



SUPPLEMENTARY IRRADIATION
BY X-RAYS (180 K.V. 1mm.Cu. 50cm.F.S.D.)
AVERAGE CASE

B

FIG. 18.

DISTRIBUTION OF RADIATION IN INTRACAVITARY RADIUM TREATMENT AND SUPPLEMENTARY X-RAY IRRADIATION

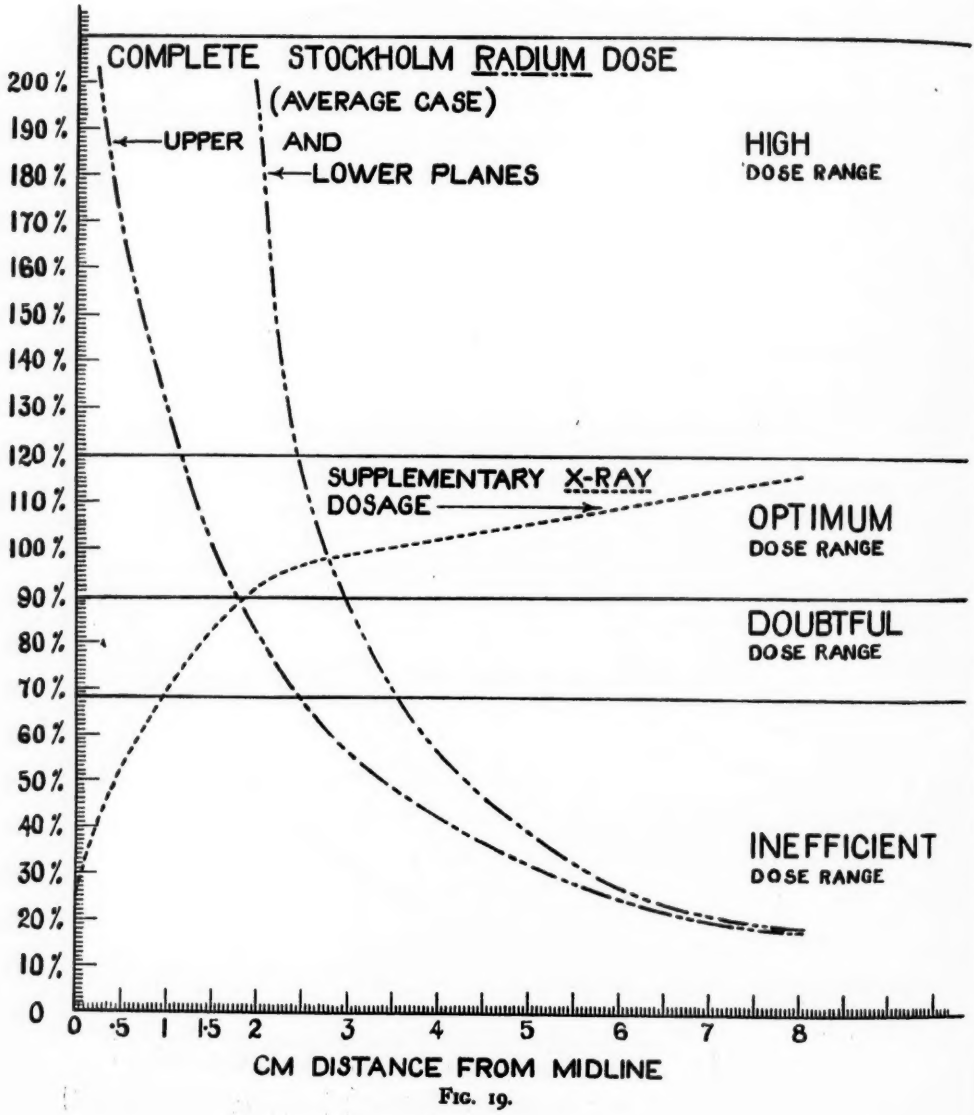


FIG. 19.

Cancer of the Cervix Uteri—The Results of Treatment with Radium

BY

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DURING the 20-year period 1922–41, 837 women with cancer of the uterine cervix were referred to the Cardiff Royal Infirmary, They were grouped into 4 clinical stages as recommended by the Radiological Sub-Committee of the League of Nations. 6 per cent were in Stage 1, 24 per cent in Stage 2, 59 per cent in Stage 3, and 11 per cent in Stage 4. The view was taken that almost all these patients were likely to benefit from irradiation, and only 10 cases were refused treatment.

The cases may be grouped into 1 of 2 periods according to the method of treatment. From 1922 to 1930 only a limited amount of radium was available and this was in the form of needles. There were 2 25 mg. needles, 3 12.5 mg. needles and 6 needles containing 5 mg. of radium element. The screenage employed was 0.5 mm. of platinum, and the usual dose was 80 to 100 mg. for 24 hours, representing a milligram-element-hour dosage of 1,800 to 2,400. The technique has been described by Professor Strachan.[1]

In 1930 a modified Stockholm technique was adopted and has since been used as a routine. In order to make maximal use of the bed-space available, the treatment is compressed into 2 exposures, usually of equal intensity of 30 hours' duration, separated by an interval of 1 week. A tube containing 50 mg. of radium element is placed in the cervical canal, and from 75 to 120 mg. are used in the vault applicators. The equivalent of 1.5 mm. of platinum is used as a filter. Deep X-ray therapy was not available at Cardiff during the period under review.

In spite of every effort to follow-up cases, 9 per cent were lost sight of within 5 years of treatment. These patients, many of whom were progressing favourably when last seen, are regarded for statistical purposes as " dead from cancer ", in addition to those who have died from causes other than cancer during the 5-year period. It is therefore probable that our 5-year figure would have improved with a better follow-up.

Our experiences with the complications of radium therapy in cervical cancer have been reviewed in a previous publication,[2] and this report is concerned primarily with the results of treatment as represented by the 5-year survival rate. The only figure of value for purposes of comparison between different centres or different methods of treatment is the Absolute Survival Rate, based on all cases seen, whether treated or not. Moreover this figure is entirely reliable only when applied to the whole group, irrespective of the stage of the disease. It is acknowledged that there is a considerable personal factor in the clinical staging of cervical cancer, and this is the only method available of eliminating the effects of the upgrading and downgrading of the clinical material.

It is observed that the proportion of early

TABLE I.

Results of Radium Treatment in Cervical Cancer 1922–1941.

	Stage 1	2	3	4	Total
Number of cases seen	53	201	494	89	837
Number of cases treated	53	201	494	79	827
Alive after 5 years	38	67	68	4	177
Absolute 5-year survival rate (percentage)	71.6	33.3	13.7	4.5	21.1
Relative 5-year survival rate (percentage)	71.6	33.3	13.7	5.0	21.4

TABLE II.

242 cases were treated by the Interstitial Method and 585 cases by the Two-application Stockholm Technique with the following results.

Interstitial (1922–30)	Stage 1	2	3	4	Total
Number and percentage of cases seen	13 (5.4)	45 (18.6)	174 (71.9)	10 (4.1)	242
Number of cases treated	13	45	174	10	242
Alive after 5 years	11	5	11	0	27
Absolute 5-year figure (percentage) ...	84.6	11	6.3		11.1
Stockholm (1930–41)					
Number and percentage of cases seen	40 (6.7)	156 (26.2)	320 (53.8)	79 (13.3)	595
Number of cases treated	40	156	320	69	585
Alive after 5 years	27	62	57	4	150
Absolute 5-year figure (percentage) ...	67.5	40	17.7	5.0	25.2
Relative 5-year figure (percentage) ...				5.8	25.6

cases (in Stages 1 or 2) increased from a quarter of the total during the first period to a third of the total during the second period. Satisfactory results were obtained with the Interstitial Method only in the first stage of the disease, and the 5-year figures fell rapidly when the cancer had extended beyond the cervix. In general the results have improved substantially since the adoption of the Stockholm technique.

ASSESSMENT OF RESULTS,

Any standard of "cure" for cancer is arbitrary, but the 5-year figure is generally regarded as the most useful. Patients, who after 5 years show no gross or symptomatic evidence of cervical cancer may be regarded as "salvaged" but not "cured". Bonney[3] states that 10 per cent of all recurrences following hysterectomy appear between the 5th and 10th years, but survival for 10 years without recurrence may be considered a cure. The same assurance cannot be given after treatment by irradiation. In our experience 15 per cent of the women surviving 5 years have died during the next 5-year period, and 6 per cent of those surviving 10 years subsequently died of cancer. A 10-year survival after the irradiation of a cervical cancer is therefore not synonymous with cure.

Three-year figures. It is often desirable to evaluate the results of a particular method of treatment in a shorter time than 5 years, and for this purpose the 3-year

salvage figures serve as a reliable guide. We confirm the observations of Meigs and Jaffe[4] that 15 per cent deducted from the 3-year survival figures for the 4th and 5th years provide a valuable index to the probable 5 year end-results. This is brought out in Table III, which gives the life expectancy of our cases treated by the Stockholm Method. 63 per cent of the patients survived 1 year, 46 per cent survived 2 years and 41 per cent survived 3 years.

TABLE III.

Life Expectancy During the 5-year Period Following Treatment by Stockholm Method.

	Stage 1	2	3	4	Total
Number of cases treated	40	156	320	69	585
Survived 1 year (No. and percentage)	35 (87.0)	125 (80.0)	201 (60.0)	21 (30.0)	382 (63.0)
2 years ,,	35 (87.0)	93 (60.0)	126 (40.0)	16 (23.0)	270 (46.0)
3 years ,,	33 (82.5)	89 (57.0)	106 (33.0)	13 (18.0)	241 (41.0)
5 years ,,	27 (67.5)	62 (40.0)	57 (17.7)	8 (5.8)	150 (25.6)
Difference between the 3 and 5-year figures	(15.0)	(17.0)	(15.3)	(12.2)	(15.4)

The patients seen during the 2nd period, 1930–41, and treated by the Two-application Stockholm Method have been chosen for more detailed examination. They provide a sufficient number of histologically confirmed cases, treated by a fairly uniform method to permit reasonably accurate statistical deductions, and the figures of this second period have been broken down to examine the effects of the following variants on the 5-year survival rates:

1. The cellular structure of the growth.
2. The clinical type of the growth.
3. The age and parity of the patient.
4. The length of history.
5. The significance of pain as a symptom when treatment is instituted.

The all-important factor governing the permanence of cure is the clinical stage of the disease when first treated, and an attempt is made to control this influence throughout.

1. *The Relation of the Histological Type of the Carcinoma to the Prognosis.*

The relation between cellular structure and response to radium was studied in a previous communication,[5] when a series of 236 cases of cervical cancer, treated by the Interstitial Method, was examined. The response was assessed first by noting the immediate reaction of the growth to irradiation, and secondly by the condition of the patient 3 years later. Our findings were inconclusive, but with the squamous-cell carcinomata our results improved slightly with the degree of anaplasia of the tumour.

We have continued to classify our material on the basis of cell structure into 3 morphological groups—the adult, ripe or spinal cell type, the plexiform mid-ripe or transitional cell type and the unripe, anaplastic spindle cell type. Although mixed tumours are the rule, in the vast majority one type of cell is predominant. In the series under review, microscopic confirmation of the diagnosis was obtained in all but 6 patients, and these had extensive ulceration of undoubted malignancy. In another 18 cases the carcinoma was of the solid type, but the biopsy material was insufficient for reliable microscopic grading. The incidence of the 4 cell types in the present and in the earlier series is shown in Table IV.

Cornification which is usually, but not

invariably, evidence of a mature growth, was noted in 8.6 per cent of the cases.

Before studying the 5-year figures in the 4 histological groups, we propose to examine the influence, if any, of the age and parity of the patient on the cellular type of the carcinoma, and whether the latter is related to the naked-eye appearance of the growth.

We are not in a position to confirm the conception that the ripe types of cancer occur in older women and the unripe types in earlier years. Table V shows the percentage distribution of cellular types of cervical cancer in women under 40 and over 60 years of age.

TABLE V.

Percentage Distribution of the 4 Histological Types in Women.

Cell type	Under 40 years	All ages	Over 60 years
	(150 cases)	(797 cases)	(150 cases)
Spinal ...	22	26	20
Transitional	68	57·7	58
Spindle ...	6	12	16
Adenocarcinoma	4	4·3	6

Although spindle-cell cancers and adenocarcinomata were slightly more common in the older women, there does not seem to be any significant relation between the age of the patient and the cell type. Neither does the parity of the patient have any influence on the morbid anatomy of the cancer. In our experience cancer of the cervix in the nulliparous differs in no respect from the disease in parous women. This applies to its pathology, age distribution and 5-year salvage after radium. Table VI shows the percentage distribution of cell types in 50 women who had never been pregnant.

TABLE IV. HISTOLOGICAL TYPES.

Cell type		1922–29	1930–41	Total
Spinal	(number and percentage)	70 (29.6)	137 (24.5)	207 (26.0)
Transitional	,, ,,	126 (53.5)	334 (59.5)	460 (57.7)
Spindle	,, ,,	30 (12.7)	65 (11.6)	95 (12.0)
Adenocarcinoma	,, ,,	10 (4.2)	25 (4.4)	35 (4.3)
		236	561	797

TABLE VI.

Cell types	Percentage distribution of cell types in 50 Nulligravidae	797 Unselected cases
Spinal ...	28	26
Transitional ...	54	57·7
Spindle ...	10	12
Adenocarcinoma	8	4·3

The incidence of cell types corresponds closely to that in the general series, but the incidence of glandular cancers was relatively higher in the nulligravidae.

Relation of cell type to the clinical appearance of the growth. Cancer of the cervix usually appears as an ulcer or as an exophytic growth. In 55 per cent of our patients the lesion was an excavated ulcer, and in 29 per cent it assumed that form of a hypertrophic, papillary or cauliflower growth. The distribution of cell types in the 2 groups is shown in Table VII.

TABLE VII.

The Relation between the Microscopic and Macroscopic Varieties of Cervical Cancer.

Cell type	Total No. of cases	Presented as	
		Hypertrophic growths	Ulcers
Spinal	207	64 (31 per cent)	123 (60 per cent)
Transitional	460	131 (26 ,, ,,)	251 (54 ,, ,,)
Spindle	95	18 (19 ,, ,,)	60 (60 ,, ,,)
Adenocarcinoma ...	35	19 (54 ,, ,,)	7 (20 ,, ,,)
	797	232 (29 ,, ,,)	441 (55 ,, ,,)

Although in general the cell structure of a cervical cancer does not seem to influence its naked-eye appearance, it is noteworthy that more than half the adenocarcinomata appeared as hypertrophic growths, while the spindle-cell cancers were much less commonly seen in this form.

Relation of cell type to the prognosis. The 5-year survival rates in the 5 cell types are shown in Table VIII. The cases are grouped into early (Stages 1 and 2) and late (Stages 3 and 4), so that the effect of the clinical stage of the disease may be controlled as far as possible.

95.7 per cent of the tumours were squamous cell carcinomata, and with these we confirm our earlier impressions,[5] that the final results improves slightly but significantly with the degree of anaplasia of the growth. Our results have not been satisfactory in the small group of adenocarcinomata.

Broders[6] has pointed out that the life history of a cell consists of two processes, reproduction on the one hand, and differentiation and specialization on the other, and in any one cell the activities of these 2 processes seem to be inversely proportional. The more a tumour differentiates, the less is its malignancy, and as applied to cancer of the cervix, this conception is supported by the results of hysterectomy. Broders,[6] Matzloff,[7] Pemberton,[8] Pomeroy and Strauss[9] and others agree that hysterec-

TABLE VIII.

Cell type	Early cases		Advanced cases		All cases	
	Number treated	5-year figure	Number treated	5-year figure	Number treated	5-year figure
Spinal	40	12 (30 per cent)	97	14 (14.4 per cent)	137	26 (19.0 per cent)
Transitional	111	57 (51 ,, ,,)	223	39 (17.4 ,, ,,)	334	96 (28.7 ,, ,,)
Spindle	25	14 (56 ,, ,,)	40	6 (15.0 ,, ,,)	65	20 (30.0 ,, ,,)
Adenocarcinoma	12	2 (16 ,, ,,)	13	1 (8.0 ,, ,,)	25	3 (12.0 ,, ,,)
	188	85 (45 ,, ,,)	373	60 (16.0 ,, ,,)	561	145 (25.8 ,, ,,)
Unclassified epitheliomata	8	4	10	1	18	5
No microscopy	0	0	6	0	6	0
	196	89	389	61	585	150 (25.6 ,, ,,)

TABLE IX.
Results of Radium Treatment.

Cell type	Early cases (St. 1 and 2)		Total	
	Number treated	5-year survivals	Number treated	5-year survivals
Spindle and transitional	136	71 (52 per cent)	299	116 (39 per cent)
Spinal and adenocarcinoma	52	14 (27 ,, ,,)	162	29 (18 ,, ,,)

tomy obtains its best results in the adult types of cervical cancer, and that the outlook after operation is particularly poor in the anaplastic spindle-cell types. With radium, the latter give results certainly as good as those obtained in the less malignant spinal-cell growths, and this is probably accounted for by their greater radiosensitivity. The more malignant anaplastic tumours appear to be more susceptible to irradiation, and the balancing of the 2 factors of malignancy and radiosensitivity seems to be responsible for producing practically the same 5-year salvage figure in the 3 histological groups.

Once treatment by irradiation has been decided upon, histological grading has therefore little practical application, but it may be the determining factor in the decision to employ irradiation rather than surgical treatment even in the earliest cases when the carcinoma proves to belong to the transitional or spindle-cell types.

On the other hand the differentiated spinal-cell tumours and glandular cancers have not responded so well to irradiation and, as shown in Table IX, even when treated at a relatively early stage (1 and 2), have given a combined 5-year figure of only 27 per cent, which may mean that they are better suited to surgical treatment. This tentative deduction must await confirmation or reversal by further investigation.

2. *The Clinical Appearance of the Growth and the Prognosis.*

Clinically the disease is manifest in one of 2 main forms—the ulcerative type in which excavation is the outstanding feature, and the hypertrophic type, which

TABLE X.
Results of Treatment in Ulcerative and Hypertrophic Growths.

	Number of cases treated	5-year figure	Early cases		Advanced cases		Percentage seen in Stage 1 or 2
			Number treated	5-year figure	Number treated	5-year figure	
Hypertrophic							
Fungating mass	63	27 (43.0)*	26	17 (65.0)	37	10 (27.0)	41
Plaque	124	36 (29.0)	48	21 (43.0)	76	15 (20.0)	39
	187	63 (33.7)	74	38 (51.0)	113	25 (22.0)	40
Ulcer	292	54 (18.5)	71	24 (33.0)	221	30 (13.5)	24
Unselected	585	150 (25.6)	196	89 (45.4)	389	61 (15.7)	33

* Figures in parenthesis denote percentages.

may take the form of a plaque or of a cauliflower-like mass which may fill the greater part of the vagina. The infiltrating and sclerosing types form smaller groups, not large enough in our material to permit statistical analysis. As previously observed ulceration was the predominant lesion in 55 per cent of the cases and in 29 per cent the cancer appeared either as a hypertrophic plaque or cauliflower growth. The 5-year results in the 2 groups are shown in Table X.

The group of hypertrophic growths include a relatively large proportion of early cases, and this probably means that as a rule they produce symptoms at an earlier stage of the disease. But irrespective of the degree of advancement of the cancer they have shown much better 5-year results than the ulcerative types, and this applies particularly to the group fungating cauliflower-like cancers.

3. *The Relation of the Age of the Patient and the Prognosis.*

Sixty-three per cent of the patients were between 40 and 60 years of age—17 per cent were under 40 years of age and 20 per cent were over 60 years. A general impression exists that cancer runs a rapid course in young people and the older the patient the better the outlook. This has not been our experience with cancer of the cervix, as shown in Table XI. Nine women (1.5 per cent) were in their twenties, and 3 of these are among the 5 year survivals. As indicated in a previous section, the incidence of the histologically malignant anaplastic type of cancer was higher in women over 60 years of age.

The proportion of patients seeking treatment at an early stage of the disease is slightly higher in women under 40 years of age, but our results fail to show any significant relation between age and prognosis.

TABLE XI.

Age and Prognosis.

Age group	No. of cases	Percentage in Stages 1 or 2	Alive after 5 years
20 to 39 years	100	39	25 (25.0)*
40 to 59 years	371	32	96 (25.9)
60 to 79 years	114	32	29 (25.4)
Under 50 years	294	35	77 (26.0)
50 years and over	291	32	73 (25.0)

* Figures in parenthesis denote percentages

4. *The Length of History and the Prognosis.*

From the onset of the first symptoms, which was usually vaginal bleeding in one form or another, there was an average pre-treatment time loss of 7 to 8 months. In general, the longer the history, the more extensive was the carcinoma, but the extent of the disease could not be estimated even approximately from the period during which the patient had symptoms. Approximately one third of our cases were treated within 6 months of the onset of the first symptom, and of these 60 per cent were already in an advanced stage of the disease. Only 1 patient in 10 received treatment within 3 months of the onset of symptoms but, as shown in Table XII, more than 50 per cent of these cases were advanced.

TABLE XII.

Relation of Duration of Symptoms and Extent of Disease.

Duration of symptoms	No. of cases	No. in Stages 1 and 2
Less than 6 months	369	145 (39 per cent)
Less than 3 months	131	56 (43 ,, ,,)
Unselected	1120	(33 ,, ,,)

In cervical cancer, there is no way of telling at what stage of the disease symptoms will appear, and in our experience the length of history does not bear any close

relation to the extent of the lesion and therefore to the prognosis.

5. *The Significance of Pain as a Symptom.*

In two-thirds of our cases the initial symptom was haemorrhage, but in 14 per cent the first symptom was pain—usually in the back, groins or lower abdomen. As previously noted, the average length of history was 7 to 8 months and, by the time the patients reached hospital, 75 per cent complained of pain. In most instances the presence of pain signifies invasion, but many complained of more pain than would be expected from the stage of clinical advancement of the growth. Half the Stage 1 cases complained of pain and there was usually no associated pelvic lesion to account for it. Pain may be due to secondary infection or to extra-uterine extension of the carcinoma not evident to clinical examination. In any event, the results shown in Table XIII indicate that, irrespective of the stage of the disease, the presence of pain in a case of cervical cancer (when first irradiated) has an adverse influence on the outlook.

2. *Morbid Anatomy.*

(*a*) 29 per cent were hypertrophic growths with or without cauliflower-like proliferation. In 55 per cent the most prominent feature was ulceration.

(*b*) 4.3 per cent were adenocarcinomata and the remainder were squamous-cell cancers. Of these 26 per cent were of the spinal-cell type, 57.7 per cent were of the transitional-cell type, and 12 per cent were anaplastic spindle-cell cancers. Cornification was evident in 8.6 per cent.

(*c*) There was nothing distinctive in the clinical appearance of the 3 histological types of squamous-cell cancers, but more than half the adenocarcinomata appeared as hypertrophic growths.

(*d*) No relation could be established between the age or the parity of the patient and the cellular structure of the growth.

(*e*) Cancer of the cervix in nulliparous women differs in no respect from the disease in parous women.

TABLE XIII.

Stage	Percentage free from pain	Cases without pain No.	Cases without pain Alive after 5 years	Cases with pain No.	Cases with pain 5-year figure	Total No.	Total 5-year figure
1	50	20	16 (80.0 per cent)	20	11 (55.0 per cent)	40	27 (67.0 per cent)
2	27	39	18 (46.0 per cent)	117	44 (37.0 ,, ,,)	156	62 (40.0 ,, ,,)
3	21	68	17 (25.0 ,, ,,)	252	40 (15.8 ,, ,,)	320	57 (17.7 ,, ,,)
4	22	15	2 (13.0 ,, ,,)	54	2 (3.7 ,, ,,)	69	4 (5.8 ,, ,,)
	25	142	53 (37.0 ,, ,,)	443	97 (21.9 ,, ,,)	585	150 (25.6 ,, ,,)

3. *Results of Treatment.*

(*a*) Interstitial radium treatment showed a 5-year salvage figure of 11 per cent—it was satisfactory only in cases in which the disease was limited to the cervix. With the Two-application Stockholm Technique, the absolute 5-year survival rate was 25.2 per cent.

(*b*) 15 per cent of the women surviving

SUMMARY AND CONCLUSIONS.

1. The results of radium treatment in a series of 827 cases of cancer of the uterine cervix are presented.

5 years have died of cancer during the succeeding 5-year period, and even 10-year survival after radiotherapy is not synonymous with cure.

(*c*) The best results were obtained in the hypertrophic growths. They produce symptoms earlier than do growths of an infiltrating nature, but they have a more favourable prognosis irrespective of the clinical stage of the disease.

(*d*) The prognosis in adenocarcinoma of the cervix is not so favourable as that in squamous-cell cancers, in spite of their tendency to develop as hypertrophic or cauliflower growths. The best results were obtained in the more anaplastic squamous-cell cancers—the mid-ripe transitional-cell types and the unripe spindle-cell types.

(*e*) The duration of symptoms was a poor index to the extent of the disease and therefore to the prognosis.

(*f*) The presence of pain does not invariably indicate advanced disease, but at all stages it has an adverse influence on the prognosis.

(*g*) This survey again demonstrates the importance of early diagnosis. By far the most important factor controlling the permanence of cure is the extent of the carcinoma when treatment is instituted.

I wish to acknowledge my indebtedness to Professor Gilbert Strachan and Dr. Arwyn Evans for access to their records and biopsy material.

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A Note on Fothergill's Colporrhaphy*

BY

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WHEN this article was first conceived, its intention was the praise of a famous surgeon, Fothergill, who died 20 years ago, during the Autumn of 1926. Some may think it has changed its character during the period of gestation and that, in fact, twin objects have been born; the first a review of the vaginal plastic operations for the cure of genital prolapse during some 80 years; and secondly an effort to counteract an attempt that has been made since Fothergill's death to belittle the value of his work.

In order to avoid any misunderstanding of these remarks, the opinions expressed by 4 former presidents of this society may be quoted. In 1930 a reference to the "Fothergill" operation is summed up—"These modifications were modifications of technique only, but the principle was the same as in Donald's operation." In the proceedings of this society will be found 2 further comments; in 1931 the remark "Fothergill modification of the Donald colporrhaphy." And in 1945 "Donald is really the originator of the Fothergill—or as I prefer to call it, Manchester operation." In our Journal in 1935 there is a reference to the "technique initiated by Professor Donald last century and subsequently modified by the late Dr Fothergill." These 4 statements appear to have been made without full knowledge of the history of this operation, and therefore a short review of its roots and growth is most necessary.

The first vaginal plastic operation for the cure of genital prolapse was performed in London in 1831. The description which follows is taken from the translation of a French treatise on Gynaecology by Madame Boivin and Monsieur Duges, a midwife and a professor; French politeness giving precedence to a *sage femme* before a university professor.

The French authors state in their text that "Dr Marshall Hall has lately cured a case of complete prolapsus by artificial contraction of the vagina." The English translator was also the surgeon of the case, and he describes his operation in a footnote which occurs only in the English translation, as follows: "It occurred to me that if the canal of the vagina could be considerably, permanently and firmly reduced in diameter, the uterus would be supported in its place, and prevented from resuming its prolapsed situation; and that this might be done by removing a portion of its mucous membrane along the anterior part, and by bringing and returning the denuded surfaces in contact by successive deep sutures, until they should unite by cicatrix.

"This operation was performed by Mr. Heming, of Kentish Town. The uterus being protruded as much as possible, by the efforts of the patient, two parallel incisions were made through the mucous membrane, from the sides of the os uteri, along the course of the protruded vagina, to the os externum, the portion of this membrane situated between these incisions was then removed, leaving a space of an inch

* Read before the North of England Obstetrical and Gynaecological Society, October 4th, 1946.

and a half in breadth, and of the entire length of the vagina, completely denuded. A suture was then inserted near the os uteri. This suture being tightened, the os uteri was obviously pushed upwards. A second, a third and other ligatures, were then inserted, in the same manner, at short intervals, to the os externum; each ligature, on being tightened, moving and supporting the os uteri upwards.

"This operation was attended with little pain; the only sensitive parts of the membrane being those near the os uteri and os externum."

This article seems to have attracted so little attention that it was completely ignored. I can find no reference in the literature to it for a period of 30 years. You will have noticed the accurate description of the behaviour of the cervix as the stitches are tied in the anterior vaginal fornix in a properly performed Fothergill operation. The second point that one might mention is the use of the terms "mucous membrane" for the epithelium of the vagina, an error which frequently occurs even today. The third comment I would make is that the fact that the operation was attended with little pain causes offence to the self-satisfaction of the local anaesthetist. The fourth comment of importance is that the aim of the surgeon is to narrow the vagina. This remains the object of the vaginal operation, with few exceptions, for 70 years. Finally it will please those who like to call the modern operation by the name "Manchester" to learn that Mr. Heming writes from Manchester Square, London, the only reason I know why the ugly name should be associated with this operation.

More than 10 years later, in the eighteen-forties, Huguier of Paris demonstrated supravaginal elongation of the cervix, and stated that hypertrophy of the cervix occurred in every case of uterine prolapse, an error that is frequently repeated even to the present day.

Huguier performed amputation of the cervix in every case and claimed considerable success.

In the fifties Baker Brown of London decided that the cure of genital prolapse could be achieved by the narrowing of the vagina to such an extent that the passage was too narrow to allow anything to descend. He contracted the vulval outlet by a very extensive perineal operation. Whether his satisfaction was equalled by that of his patients or their husbands we have no direct evidence.

Another decade passes, and in 1866 we find Marion Sims in London. He had voluntarily left America in 1862 on account of the political troubles; he served as a surgeon in Paris in 1871, and did not return home until after the Franco-Prussian War had ended. In 1866 he published, in London, a book with the title *Clinical Notes on Uterine Surgery with Special Reference to the Management of the Sterile Condition*. There were 8 sections, each with a title relative to conception. Section 5, which is the one to which I shall refer, is headed "The uterus should be in a normal position, i.e., neither anteverted nor retroverted to any great degree." The sixth subheading to this section is "Procidentia Uteri."

Sims points out that many surgeons practised amputation of the cervix, or contraction of the vulvar outlet by perineal operation for the relief of genital prolapse. He was unaware of Heming's work 25 years earlier, until his own operation on the anterior vaginal wall was standardized. Sims was the first to do many plastic vaginal operations for the relief of prolapse, but his object was quite definitely to narrow the vagina, but much higher up than could be done by perineal operations.

In 1856 he had been consulted by a lady

with a large prolapse. He remarks rather naively: "This was the first time I had had a good opportunity of observing and studying the manner in which the procidentia occurred." It was evidently a case of classical prolapse with the bladder leading the descent. He noticed the large cystocele, and, remembering the very great success he had had in the repair of vesicovaginal fistula, he seriously proposed to this lady to make a complete vesicovaginal fistula by removing at once a large portion of the base of the bladder with the anterior vaginal wall. She agreed, and he laid the plan of operation before the consulting board of the hospital. I quote his account of the operation: "Proposing to excise the anterior wall of the vagina I hooked it up with a tenaculum, pulled it well towards the posterior wall, and then grasped the base of the mass thus elevated with a pair of curved forceps made for the purpose, which held the parts firmly embraced, while with scissors cutting under the forceps I removed at once a very large portion of the anterior vaginal wall. The chasm made was fearful. My surprise was equalled only by my delight when I found that I had not succeeded in doing what I intended; for instead of excising the base of the bladder I had simply raised the vaginal tissue up between the blades of the forceps, luckily separating it from the lining membrane of the bladder which remained intact." I wonder if any other surgeon has been surprised and delighted at failing to accomplish that which he attempted to do!

He continued to operate on similar cases, but used no more the special forceps with which he clamped the cystocele. Instead he simply removed the vaginal epithelium.

However, he found the necessary scarification both tedious and bloody; and also there was a danger of local inflammation. One of his failures led him to devise another method of operation. He "simply removed the mucous membrane in the form of a V, the apex being near the neck of the bladder, the two arms extending up on the sides of the cervix. These two denuded surfaces were brought together by silver sutures thus making a longitudinal fold narrowing the vagina and crowding the cervix backwards."

Again you will notice that the surgeon remarked on the cervix being pushed backwards when the stitches are tied. The anatomical importance of this is not grasped, but the narrowing of the vagina is still stressed.

Another failure led him to alter the shape of the denuded area from a simple V to a trowel shape. He sums up the situation by saying: "So far as mere surgical resources are concerned, we have now three processes from which to choose; always, of course, adapting this choice to the particular exigencies of the case.

"1. Amputation of the cervix when its infravaginal portion is too long.

"2. The perineal operation.

"3. The operation of narrowing the vagina by denudation of its anterior wall as herein illustrated. Sometimes, as in cases of rectocele, it is necessary to narrow the posterior wall of the vagina as well as the anterior."

It is doubtful whether he amputated the cervix in addition to narrowing the vagina; although he was well aware of the very considerable hypertrophy or elongation of the cervix, he only advised operation when its infra-vaginal portion was too long.

Emmet remained in America and continued to operate, using the same technique that Sims introduced. Reading between the lines one gathers that healing was by no means perfect. Emmet reports such a case he had in 1869 in which the colporrhaphy only healed near the cervix, but in spite of this the result was good. Again you will notice a hint that the cure of prolapse of

the uterus can be brought about by operation in front of the cervix. Even Emmet, although he reported the case, did not realize its full significance.

In the seventies, Hegar introduced his operation of posterior colpoperineorrhaphy. His name remained attached to this operation for many years. In fact the first vaginal plastic operation reported to this society some 20 years later was described by Gemmell, and he used Hegar's name. This was a very wide operation with its apex as close as possible to the cervix uteri. Hegar published in 1889 his Cyclopaedia, and one gathers that the cure of a procidentia required a 2-stage operation; the first an amputation of the cervix and an elytrorrhaphy, both anterior and posterior. This word means the same as colporrhaphy. But he says that the main operation — colpoperineorrhaphy — is performed after the parts have healed. It is possible that the translation of his book is not particularly good, but it is difficult to understand why 2 operations were required on the posterior vaginal wall. It was a Frenchman who compared translations to ladies: *Lorsque elles sont belles, elles ne sont pas fidèles.*

For many years after Hegar's description of his work was first published there appeared a large number of articles describing alterations in the shape, size, and position of the vaginal incisions in the plastic operations, interposition operations and finally abdominal operations. None of the authors appeared to appreciate the anatomical basis for the proper cure of uterine prolapse until the early years of the present century. I am, therefore, ignoring these as they had no influence on Fothergill's later work.

Some of the work is interesting and amusing, and I will draw your attention to a paper by Emmet on ruptured perineum. The prolapse of the posterior vaginal wall, which is so frequently associated with this condition or with a badly stitched perineal tear, he claimed could be cured by a colporrhaphy with a transverse incision across the posterior vaginal wall. The pathological anatomy of this condition, which was a separation of the vaginal wall from the underlying fascia, was best understood, he thought, if one imagined that one's pantaloons had become separated from their suspenders.

His simile was not approved by all his audience. Dr. T. A. Reamy told the meeting: "He has stated that the separation from this fascia is just the same as though his pantaloons should be separated from his suspenders. I will carry the illustration a little further, and say that if he restores the suspenders it is all very well; but if the pantaloons are split open the full length of the seat, it will not include the whole condition unless he restores them also; and so if he lifts up the split perineum without closing the laceration, it is just the same as to lift up the seat of his pantaloons without uniting the rent."

As an example of the ingenuity of surgeons may be mentioned the case operated on by Freund in 1908. The woman had procidentia and a large inguinal hernia. The operation was a hysteropexy of the uterus in the inguinal canal thus fulfilling two functions:

(1) The corking up of the canal so that the hernia could not descend, and

(2) The fixation of the fundus so that the cervix could not prolapse.

It is often said that Manchester was teaching the world from about the year 1888 how to cure prolapse. I have searched through the literature, including the transactions of this society, for evidence of this fact without success. In 1893 Alexander read a paper on his operation on the round ligaments. About 50 per cent were cases of uterine prolapse. Donald advised col-

poperineorrhaphy for procidentia. The term colpoperineorrhaphy at this date was generally used to mean Hegar's operation on the posterior vaginal wall.

In 1894 Gemmell described a case of complete prolapse with cystocele and rectocele treated by Hegar's posterior colpoperineorrhaphy. Donald said he had been interested for some years in vaginal operations for prolapse. The reason for failure was that the methods adopted were not sufficiently thorough. In all cases the operation should consist of 3 stages at least: (1) Anterior colporrhaphy. (2) Posterior colporrhaphy. (3) Perineorrhaphy. In cases where there was much enlargement of the uterus supra-vaginal amputation of the cervix was also necessary.

The only other comment came from Wallace: "To talk about curing a cystocele after colpoperineorrhaphy was like placing the cart before the horse—it could not be done."

In 1896 Curtis Webb read a paper on vaginal fixations of the uterus. There was no comment from Manchester.

In the early days of the century the anatomists were beginning to be interested in the anatomy of the female pelvis. Various surgeons attempted to secure the transverse ligaments (or Mackenrodt's ligaments) and sew them in front of the cervix.

In 1902 Reynold in America suggested a crescentic flap in front of the cervix. And in the following year Alexandroff proposed a curved transverse incision across the anterior vaginal fornix.

In 1905 Tweedy suggested an operation opening the anterior vaginal fornix into the peritoneal cavity, detaching Mackenrodt's ligaments from their lateral attachments and sewing them on to the anterior surface of the cervix.

In 1907 Fothergill read a paper before the Royal Society of Medicine on the anatomy of the female pelvis and before the Edinburgh Obstetric Society at about the same time described his first anterior colporrhaphy. This operation was not the one which we know these days by his name. Where necessary the first stage of the operation was an amputation of the cervix by one of the well-known methods. The second stage of the operation was an anterior colporrhaphy with the area of epithelium to be removed triangular in shape, the base of the triangle being a transverse incision across the anterior vaginal fornix, and reaching widely outwards towards the lateral fornices so that the transverse ligaments of the cervix could be reached and brought together in front of the cervix when the repair operation began. Fothergill at this time stated that he frequently opened the abdomen and did a ventrofixation of the uterine body.

In 1908, shortly after Fothergill's articles had been published, Donald wrote up an article on the cure of uterine prolapse. Where necessary he amputated the cervix by the removal of wedges from the anterior and posterior lips. His anterior colporrhaphy you will notice is also triangular in shape, with the base close to the urethral orifice, and the apex in the region of the cervix. No deep sutures are used, and at the end of this stage of the operation there is nothing to prevent the cervix from being pulled right outside the vulva. The posterior colporrhaphy is identical with that of Hegar, even to the extreme narrowness of the vagina which results from this part of the operation. Again no deep sutures were used. Donald's own description of this is that the lateral incisions end midway between the fourchette and the vestibule. This can only mean that the anterior-posterior diameter of the vagina at its entrance is reduced to half the size it was before the first pregnancy occurred. In fact in my resident days

this operation was referred to as the slate pencil colporrhaphy, and there was nothing original in it for it is almost identical with Hegar's operation, and is based on the theory begun in 1831 and carried on for over 75 years that in vaginal plastic work the cure of prolapse depended on narrowing the vagina.

I have been unable to find any record of one variation of this technique which Fothergill liked much and used when the case was suitable. When the cervix was not hypertrophied or elongated the incisions beginning as usual in the neighbourhood of the urethra passed upwards and outwards into the vaginal lateral fornices as

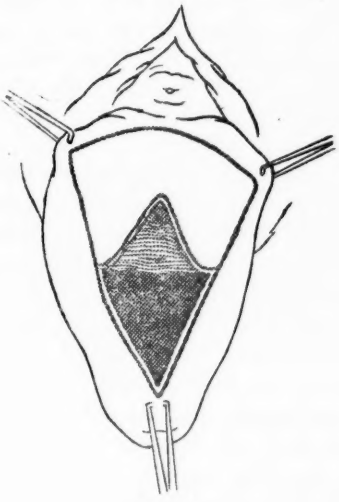

FIG. 1.

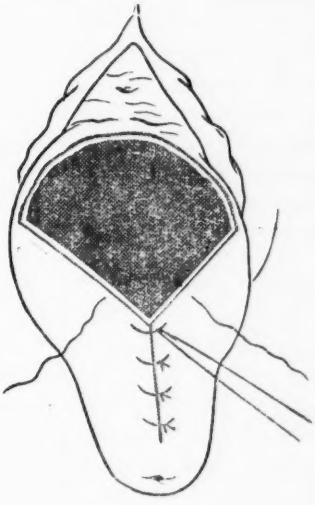

FIG. 2.

Two of the diagrams published in Donald's first article in 1908. Fig. 1 illustrates that the incisions in the cervix are between 1 and 2 inches distant from the ligaments of Mackenrodt. Fig. 2 shows that when all suturing of the cervix is completed, there is no change in the position of this prolapsed organ.

It was not until 1913 that Fothergill published the details of his final operation as it is known to-day. He himself described his operation as an amputation of the cervix with wide anterior racquet incision. The object of these wide incisions was, as we all know, so that the ligaments, by whatever name you like to call them, the transverse ligaments of the cervix, Mackenrodt's ligaments, the cardinal ligaments of the cervix, Patenson's, and so on, which lie above the lateral vaginal fornices might be brought in front of the cervix as the wound was being repaired.

usual, but the transverse incisions which joined the two together did not pass behind the cervix, but came directly in to the cervix at three o'clock and nine o'clock, so that only the anterior lip of the cervix was amputated, and very little of that was removed. As I have said, the cervix was not enlarged and did not need amputating, but by this method he obtained access to the ligaments he wanted above the lateral vaginal fornices.

In 1921 at the British Congress of Obstetrics and Gynaecology Donald read a paper on " A short history of the opera-

tion of colporrhaphy with remarks on the technique."

His final remarks on technique are: "One cannot have a very extensive operation on both walls (of the vagina). When cystocele is not the main feature, I regard the building up of a firm posterior wall as the important point. One must recognize, if one is to have any success, that the deep tissues, the triangular ligament or the levator ani muscles must be brought together by deep sutures."

There have been several short histories of the operations which are included under the term vaginal plastic operations for prolapse in the *Journal of Obstetrics and Gynaecology of the British Empire*, and in every one of these is found repeated the same strange mistakes.

Taking them in chronological order: In 1921 an article by Donald with the title: "A short history of the operation of colporrhaphy." The history of the operation before he himself began to practice it in 1888 is condensed into one sentence as follows:* "It is true that one had read accounts of operations done in America and Germany" and he ends the paragraph with the discouraging remarks taken from the textbook of Hart and Barbour.

In August 1936 is published a paper by Gray Ward which he had read before the British Congress in Belfast the same year. He lays down certain principles for the cure of the various varieties of genital prolapse, and attempts to decide which surgeon should receive credit for being the first to appreciate and employ a definite principle. For example he claims that Sims was the first "to completely expose the base of the bladder" as is done to-day. You will note how dexterously he splits the infinitive in referring to Sims's attempt to clamp the prolapsed anterior vaginal wall together with the bladder and to cut them both off together. It is incorrect to say that this is how the operation is done to-day; and it is also incorrect to say that Sims appreciated the principle attached to exposing the base of the bladder, for he never attempted to do this again.

Later in the same article, referring to procidentia, he says: "The principle of reefing the overstretched cardinal ligaments by approximating them in front of the cervix or its stump, if amputated, is a *sine qua non* for the cure of its prolapse, if that organ is to be conserved. To Donald would seem to belong the credit for first appreciating and employing this principle in a definite manner in 1888. He combined an extensive anterior and posterior colporrhaphy with amputation of the cervix, using deeply buried sutures which approximated the fascial structures in front of the cervix, and below the vaginal mucosa.

He had evidently never read Donald's paper of 1908 or seen the only diagrams he published, or he would have realized two facts: (1) That the incisions used in this particular operation prevented access to the cardinal ligaments. (2) He did not use buried sutures until some time after Fothergill had been writing much on genital prolapse.

In August 1940 Stallworthy published an article on the result of operation on genital prolapse. He begins with a historical survey, and after mentioning some of the earlier work, he calls attention to the fact that the credit of combining anterior and posterior colporrhaphy goes to Tracy in Australia in the year 1862. From this date only one advance in surgery is mentioned: "The next great advance was made in Manchester when, in 1888, Donald combined a double colporrhaphy with amputation of the cervix. By removing a diamond-shaped area from the anterior vaginal wall and vault he displayed the

paracervical condensations of fascia with which he strengthened the repair."

How strange and almost incredible is the transference of the credit for the discovery of certain surgical principles from one surgeon to another. The only explanation is that the author has not read the articles of either surgeon.

If I were asked the difference between the operation that Donald performed for the cure of genital prolapse and Fothergill's operation I should say that Fothergill's was an entirely new and original procedure, with a firm base on a knowledge of anatomy and the correct conception of the character and position of the structures which maintained the normal uterus in position; and finally an appreciation of the damage done to these structures during parturition, and the best method of repairing this damage.

The operation which Donald performed was not original, being identical with that of Hegar. Its technique was not based on any knowledge of anatomy, but on the 60-year-old theory that narrowing of the vagina was the only hope of the patient. Donald went so far as to compare his operation to the radical cure of a hernia.

I never regarded Fothergill as a great abdominal surgeon, or as a particularly outstanding diagnostician; but he was a first-rate pathologist. His claim to greatness rests on his vaginal plastic work, and it is impossible to stand quietly aside while attempts continue to be made to detract from his reputation. Finally I will quote a house surgeon's opinion of him taken from a Christmas play written in the Gilbert style:

A "Webster's-Sling" young man,
A tongue-with-a-sting, young man,
A man who glories in dubious stories,
Colporrhaphy-King young man!

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The Interpretation of Tests for Renal Function*

BY

C. G. PAINE.

THIS paper deals with the *rationale* of the test of renal function that is employed at the Jessop Hospital for Women in cases of toxaemia of pregnancy, and with the picture that the various clinical stages of the disease present in renal function tests.

From the point of view of function, the kidneys may be described as two localized masses of nephron units, and because of their multiplicity and their relative independence, one would expect that the kidneys as a whole would show considerable powers of compensation and reserve, which indeed they do.

One would also expect that renal function tests, assessing as they do mass function and not individual nephron activity, might easily indicate good function, even when considerable anatomical damage to the kidneys had actually occurred. This again is generally accepted. It therefore follows that if the tests do show even minor degrees of renal insufficiency, then the results theoretically ought always to be of clinical significance. That unfortunately is not the case, and renal function tests have to some extent fallen into disrepute.

It seemed to me, therefore, that it would be worth while combining a series of these tests and, by checking one aspect of kidney function against others, obtain a clearer picture of the capabilities of the kidneys at the time of test than was possible previously.

The test we now employ is a combination of the urea concentration test, the Van Slyke and the Fowweather tests with two non-protein-nitrogen estimations included for completeness. The procedure is as follows:

1. No food or fluids after midnight.
2. At "zero hour" (usually 4.30 a.m.) the bladder is emptied by catheter.
3. One hour later. Bladder again emptied by catheter; 10 ml. blood taken. 15 g. urea in 300 ml. water by mouth.
4. One hour later. Bladder again catheterized. Second blood specimen taken.
5. One hour later. Bladder emptied by catheter.
6. One hour later. Bladder emptied by catheter.

For the purposes of the clearance-calculations it is important that the exact time to the minute of collection of specimens is noted.

FIG. 1.

KIDNEY FUNCTION TEST.

Specimen of Normal Urinary Specimens.

Time	Volume (ml.)	Specific gravity	Urea (percentage)	Urea, Total (g.)	Albumin (percentage)
Zero	400	1016	2.00	8.000	Nil
1 hour	40	1016	1.80	0.720	Nil
2 hours	120	1010	1.70	2.040	Nil
3 hours	100	1016	2.50	2.500	Nil
4 hours	80	1018	2.80	2.240	Nil

* Read before a meeting of the North of England Obstetrical and Gynaecological Society, February 1st, 1946.

Urea Concentration Test.

Volume of urine secreted in 3 hours after urea, 300 ml.

Weight of urea excreted in 3 hours after urea, 6.780 g. (over 6.0 g.)

Average urea concentration, 2.26 per cent (over 2.0 per cent).

Blood Specimens.

Blood urea before urea, 18 mg. per 100 ml.

Non-protein-nitrogen before urea, 18 mg. per 100 ml.

Blood urea after urea, 35 mg. per 100 ml.

Non-protein-nitrogen after urea, 30 mg. per 100 ml. (less than 40).

Urea Clearance Test before Urea (Van Slyke).

Volume of urine, 40 ml. (Time, 60 minutes).

Volume of urine per minute, 0.67 ml.

Urinary urea, 1,800 mg. per 100 ml.

Blood urea, 18 mg. per 100 ml.

Standard clearance per minute, $1{,}800/18 \times \sqrt{0.67}$ ml.

$= 82$ ml. (54 ml. Standard).

$= 152$ per cent of normal (75 ml. maximal).

Urea Clearance after Urea (Fowweather).

Volume of urine, 100 ml. (Time 60 minutes).

Volume of urine per minute, 1.67 ml.

Urinary urea, 2,500 mg. per 100 ml.

Blood urea, 35 mg. per 100 ml.

Clearance per minute, $2{,}500/35 \times \sqrt{1.67}$ ml.

$= 92$ ml.,

$= 103$ per cent of normal (75 ml.).

Fig. 1 shows a typically normal result and I would draw your attention to certain points.

1. Volumes: Post-urea diuresis.

2. Specific gravity: Post-urea dilution and rapid recovery.

3. Absence of albumin: Essential for normality, but its absence does not necessarily mean that the kidney is normal. This statement is in contradiction of the usual view, and will be substantiated later.

4. Urea-concentration test: (*a*) Volume of urine, 200 to 300 ml. Volumes below this are often associated with toxaemia; volumes above, with hypertension or chronic nephritis.

(*b*) Total urea: Should be over 6 g.

(*c*) Average concentration: Over 2 per cent (2 per cent without a total over 6 g. I do not consider normal but as merely indicating that the kidney can still concentrate).

5. Blood specimens: Estimations of urea and non-protein-nitrogen are done on both blood specimens. High values before urea (non-protein-nitrogen over 40) are significant of severe kidney disfunction.

(*a*) Normal values have not the opposite significance. Even in severe toxaemias and particularly when they are on a low-protein diet one usually gets normal values.

(*b*) High values after urea are indicative of nitrogen-retention: for non-protein-nitrogen values forty is usually taken as the upper limit of normality.

Low values usually indicate absence of nitrogen-retention, but there are two conditions to be remembered when this does not hold good:

(*a*) In the presence of excessive oedema nitrogen-retention can occur without a significant rise in second-blood values.

(*b*) The patient may have vomited the urea given by mouth.

6. *The Clearance Test.*

The first of these (Van Slyke's) is calculated from data obtained under basal conditions, second specimen urine (1 hour) and first blood urea.

Second test (Fowweather's) is calculated from the fourth urine specimen (3 hours) i.e., post diuretic and the second blood specimen.

For those of you who are not familiar with this test, the clearance may be defined as "The volume of blood that could be completely cleared of urea by the kidneys

in 1 minute, if that were physiologically possible."

A word about "standard" and "maximal" clearance. The excretion of urea is exactly proportional to the volume of urine secreted if the volume of urine secreted is over 2 ml. per minute. Under these circumstances we take 75 ml. of blood as the so-called 100 per cent maximal clearance.

When the volume of urine excreted is is below 2 ml. the excretion of urea is proportional to the square root of the volume of urine excreted. Under these circumstances we take 54 ml. as the so-called 100 per cent standard clearance.

The standard and maximal clearance volumes apply to both the Van Slyke and Fowweather tests, but in the case of the Fowweather clearance the volume for normality is always taken as 75 ml. since it is reasoned that the diuretic effect of giving urea should normally increase the urinary output to maximal volumes.

In both Van Slyke and Fowweather clearance tests, clearance values above 75 per cent of normal are generally considered as satisfactory; between 50 and 75 per cent indicate mild deficiencies; and below 50 per cent severe renal damage.

I want now to turn to the picture presented by the toxaemias of pregnancy. First the mild case, which is commonly seen about the 25th week.

Here is the actual report on such a case:

CASE 1. Aged 37 years; primigravida; 24 weeks pregnant. No significant medical history. Slight oedema for 3 weeks. Blood-pressure 156/100. Urine: albumin 0.025 mg./100.

FIG. 2.

RENAL FUNCTION TEST.

CASE 1. Serial No. P. 47/45; 24 weeks pregnant, April 6th, 1945.

Urinary Specimens.

Time	Volume (ml.)	Specific gravity	Urea (percentage)	Urea, Total (g.)	Albumin (percentage)
4.30	295	1013	1.70	5.015	0.025
5.30	40	1014	1.40	0.560	0.025
6.30	64	1014	1.90	1.216	0.010
7.30	82	1013	2.50	2.050	0.010
8.30	70	1013	2.30	1.610	0.010

Urea Concentration Test.

Volume of urine secreted in 3 hours after urea, 216 ml.

Weight of urea excreted in 3 hours after urea, 4.876 g.

Average urea concentration, 2.25 per cent.

Blood Specimens.

Blood urea before urea, 36 mg. per 100 ml.

Non-protein-nitrogen before urea, 36 mg. per 100 ml.

Blood urea after urea, 62 mg. per 100 ml.

Non-protein-nitrogen after urea, 47 mg. per 100 ml.

Urea Clearance Test before Urea (Van. Slyke).

Volume of urine, 40 ml. (Time, 60 minutes).

Volume of urine per minute, 0.67 ml.

Urinary urea, 1,400 mg. per 100 ml.

Blood urea, 36 mg. per 100 ml.

Standard clearance per minute,

$$1{,}400/36 \times \sqrt{0.67} \text{ ml.}$$

$$= 32 \text{ ml.},$$

$$= 63 \text{ per cent of normal.}$$

Urea Clearance after Urea (Fowweather).

Volume of urine, 82 ml. (Time, 60 minutes).

Volume of urine per minute, 1.37 ml.

Urinary urea, 2,500 mg. per 100 ml.

Blood urea, 62 mg. per 100 ml.

Clearance per minute,

$$2{,}500/62 \times \sqrt{1.37} \text{ ml.}$$

$$= 47 \text{ ml.},$$

$$= 63 \text{ per cent of normal.}$$

Note:

1. Slight delay in concentration (specific gravity).
2. Low total urea.
3. Slightly raised first blood values (within normal).
4. Raised second blood values indicating nitrogen-retention.
5. Both clearances indicate mild deficiency.

After 2 weeks' rest and treatment there was no oedema; blood-pressure 126/92.

FIG. 3.

RENAL FUNCTION TEST.

CASE 1. Serial No. P. 112/45, 26 weeks pregnant, April 20th, 1945.

Urinary Specimens.

Time	Volume (ml.)	Specific gravity	Urea (percentage)	Urea, Total (g.)	Albumin (percentage)
4.30	314	1013	1.8	5.652	0.020
5.30	40	1013	1.4	0.560	0.020
6.30	68	1010	1.9	1.292	0.010
7.30	110	1016	2.3	2.530	0.010
8.30	86	1017	2.3	1.892	0.015

Urea Concentration Test.

Volume of urine secreted in 3 hours after urea, 264 ml.

Weight of urea excreted in 3 hours after urea, 5.714 g.

Average urea concentration, 2.16 per cent.

Blood Specimens.

Blood urea before urea, 23 mg. per 100 ml.

Non-protein-nitrogen before urea, 21 mg. per 100 ml.

Blood urea after urea, 52 mg. per 100 ml.

Non-protein-nitrogen after urea, 42 mg. per 100 ml.

Urea clearance Test before Urea (Van Slyke).

Volume of urine, 40 ml. (Time, 60 minutes).

Volume of urine per minute, 0.67 ml.

Urinary urea, 1400 mg. per 100 ml.

Blood urea, 23 mg. per 100 ml.

Standard clearance per minute,

$$1400/23 \times \sqrt{0.67} \text{ ml.}$$

$=49.5$ ml.,

$=92$ per cent of normal.

Urea Clearance after Urea (Fowweather).

Volume of urine, 110 ml. (Time, 60 minutes).

Volume of urine per minute, 1.83 ml.

Urinary urea, 2300 mg. per 100 ml.

Blood urea, 52 mg. per 100 ml.

Clearance per minute,

$$2300/52 \times \sqrt{1.83} \text{ ml.}$$

$=60$ ml.,

$=80$ per cent of normal.

Note:

1. Water excretion increased.
2. Improved concentration (specific gravity).
3. Total urea approaching normal.
4. Low first blood values (low protein diet).
5. Very slightly raised second blood values.
6. Clearances improved.

This patient was kept under close supervision and remained well until the 32nd week, when there was a return of symptoms. Blood-pressure 150/108; Urine: albumin 0.05 mg./100; slight oedema of feet and sacrum.

FIG. 4.

RENAL FUNCTION TEST.

CASE 1. Serial No. P.145/45, 32 weeks pregnant, June 15th, 1945.

Urinary Specimens.

Time	Volume (ml.)	Specific gravity	Urea (percentage)	Urea, Total (g.)	Albumin (percentage)
4.30	330	1015	1.5	4.950	0.1
5.30	47	1013	1.2	0.564	0.1
6.30	71	1012	1.7	1.207	0.1
7.30	86	1011	2.0	1.720	0.05
8.30	63	1012	2.2	1.386	0.1

Urea Concentration Test.

Volume of urine secreted in 3 hours after urea, 220 ml.

Weight of urea excreted in 3 hours after urea, 4.313 g.

Average urea concentration, 1.96 per cent.

Blood Specimens.

Blood urea before urea, 23 mg. per 100 ml.

Non-protein-nitrogen before urea, 30 mg. per 100 ml.

Blood urea after urea, 41 mg. per 100 ml.

Non-protein-nitrogen after urea, 48 mg. per 100 ml.

Urea Clearance Test before Urea (Van Slyke).

Volume of urine, 47 ml. (Time, 60 minutes).
Volume of urine per minute, 1.43 ml.
Urinary urea, 1200 mg. per 100 ml.
Blood urea, 23 mg. per 100 ml.
Standard clearance per minute,

$$1200/23 \times \sqrt{0.78} \text{ ml.}$$

$=46$ ml.,
$=85$ per cent of normal.

Urea Clearance after Urea (Fowweather).

Volume of urine, 86 ml. (Time, 60 minutes).
Volume of urine per minute, 1.43 ml.
Urinary urea, 2000 mg. per 100 ml.
Blood urea, 41 mg. per 100 ml.
Clearance per minute,

$$2000/41 \times \sqrt{1.43} \text{ ml.}$$

$=58.5$ ml.,
$=78$ per cent of normal.

Note:

1. Delay in concentration (specific gravity).
2. Low total urea.
3. Slight rise in second blood values but no obvious nitrogen-retention on clearance values.

Her condition did not improve despite treatment and her blood-pressure remained stationary at the raised level.

At 37 weeks: blood-pressure 156/108; headaches and visual disturbances; slight oedema of abdominal wall and legs.

FIG. 5.

KIDNEY FUNCTION TEST.

CASE 1. Serial No. P. 167/45, 37 weeks pregnant, July 19th, 1945.

Urinary Specimens.

Time	Volume (ml.)	Specific gravity	Urea (percentage)	Urea, Total (g.)	Albumin (percentage)
4.30	565	1004	0.90	5.085	0.05
5.30	42	1010	1.20	0.494	0.10
6.30	35	1010	1.80	0.630	0.15
7.30	47	1010	2.60	1.222	0.10
8.30	30	1012	2.40	0.720	0.10

Urea Concentration Test.

Volume of urine secreted in 3 hours after urea, 112 ml.

Weight of urea excreted in 3 hours after urea, 2.572 ml.

Average urea concentration, 2.30 per cent.

Blood Specimens.

Blood urea before urea, 28 mg. per 100 ml.

Non-protein-nitrogen before urea, 30 mg. per 100 ml.

Blood urea after urea, 57 mg. per 100 ml.

Non-protein-nitrogen after urea, 49 mg. per 100 ml.

Urea Clearance Test before Urea (Van Slyke).

Volume of urine, 42 ml. (Time, 60 minutes).
Volume of urine per minute, 0.70 ml.
Urinary urea, 1200 mg. per 100 ml.
Blood urea, 28 mg. per 100 ml.
Standard Clearance per minute,

$$1200/28 \times \sqrt{0.70} \text{ ml.}$$

$=36$ ml.,
$=67$ per cent of normal.

Urea Clearance after Urea (Fowweather).

Volume of urine, 47 ml. (Time, 60 minutes).
Volume of urine per minute, 0.78 ml.
Urinary urea, 2600 mg. per 100 ml.
Blood urea, 57 mg. per 100 ml.
Clearance per minute,

$$2600/57 \times \sqrt{0.78} \text{ ml.}$$

$=40.5$ ml.,
$=54$ per cent of normal.

Note:

1. Urinary volume diminished.
2. Total urea falling.
3. Second blood values rising.
4. Clearances falling.

This patient was induced at once and had a spontaneous delivery of a live female child.

It might appear at this stage that these rather elaborate tests yielded very little more information than could be gained in the ward. At first the patient responded obviously to treatment and later she did not, and the clinical picture told all that. The renal function tests merely confirmed this. That is indeed the general impression gained from tests carried out in the antenatal period. Occasionally the renal function test anticipates the clinical picture of failure.

In addition to renal function tests done during pregnancy we have had the opportunity to follow up a considerable number of cases after delivery, and here I feel that the test gives a much clearer idea of the ultimate result of renal function than that shown by the general clinical picture.

To summarize these results I think that it may be said that one of three things may happen in renal function tests following toxaemia of pregnancy.

1. There may be a rapid return to normal function. This is relatively uncommon in my experience.

2. There may be a very prolonged period of renal deficiency. This I would like to call the post-toxaemic state. It may gradually revert to normal or may gradually merge into the third condition.

3. The secondary hypertensive state.

The pictures given by renal function tests are reasonably clear-cut in the last two conditions—the post-toxaemic and the secondary hypertensive state, and below are two figures (Nos. 6 and 7) illustrating these.

FIG. 6.

RENAL FUNCTION TEST.

Specimen of post-toxaemic state.

Urinary Specimens.

Time	Volume (ml.)	Specific gravity	Urea (percentage)	Urea, Total (g.)	Albumin (percentage)
Zero	186	1018	2.0	3.720	0.1
1.0 hour	27	1018	1.8	0.486	0.1
2.0 hours	60	1014	1.4	0.840	0.05
3.0 hours	78	1017	1.9	1.520	0.1
4.0 hours	44	1018	2.2	0.968	0.1

Urea Concentration Test.

Volume of urine secreted in 3 hours after urea, 182 ml.

Weight of urea excreted in 3 hours after urea, 3.328 g.

Average urea concentration, 1.84 per cent.

Blood Specimens.

Blood urea before urea, 28 mg. per 100 ml.

Non-protein-nitrogen before urea, 26 mg. per 100 ml.

Blood urea after urea, 75 mg. per 100 ml.

Non-protein-nitrogen after urea, 55 mg. per 100 ml.

Urea Clearance Test before Urea (Van Slyke).

Volume of urine, 27 ml. (Time, 60 minutes).

Volume of urine per minute, 0.45 ml.

Urinary urea, 1800 mg. per 100 ml.

Blood urea, 28 mg. per 100 ml.

Standard maximal clearance per minute,

$$1800/28 \times \sqrt{0.45} \text{ ml.}$$

$$= 43 \text{ ml.},$$

$$= 80 \text{ per cent of normal.}$$

Urea Clearance after Urea (Fowweather).

Volume of urine, 78 ml. (Time, 60 minutes).

Volume of urine per minute, 1.30 ml.

Urinary urea, 1900 mg. per 100 ml.

Blood urea, 75 mg. per 100 ml.

Clearance per minute,

$$1900/75 \times \sqrt{1.30} \text{ ml.}$$

$$= 29 \text{ ml.},$$

$$= 39 \text{ per cent of normal.}$$

Post-toxaemic State.

Note:

1. Good concentrating powers (specific gravity and urea percentage).
2. Persistence of moderate amount of albumin.
3. Low water-excretion.
4. Low total urea.
5. Normal first blood values.
6. Good (Van Slyke) clearance under basal conditions.
8. Poor (Fowweather) clearance } Nitrogen-
7. Raised second blood values. } retention under load.

This might be termed a " low reserve kidney " associated with albuminuria.

Secondary Hypertensive State.

FIG. 7.
RENAL FUNCTION TEST.

Specimen of secondary hypertensive state.

Urinary Specimens.

Time	Volume (ml.)	Specific gravity	Urea (percentage)	Urea, Total (g.)	Albumin (percentage)
Zero	420	1018	1.0	4.20	Trace
1	70	1014	0.8	0.56	Trace
2	110	1009	1.4	1.54	Trace
3	110	1010	1.4	1.54	Trace
4	90	1010	1.5	1.35	Trace

Urea Concentration Test.

Volume of urine secreted in 3 hours after urea, 310 ml.

Weight of urea excreted in 3 hours after urea, 4.43 g.

Average urea concentration, 1.42 per cent.

Blood Specimens.

Blood urea before urea, 38 mg. per 100 ml.

Non-protein-nitrogen before urea, 35 mg. per 100 ml.

Blood urea after urea, 60 mg. per 100 ml.

Non-protein-nitrogen after urea, 52 mg. per 100 ml.

Urea Clearance Test before Urea (Van Slyke).

Volume of urine, 70 ml. (Time, 60 minutes).
Volume of urine per minute, 1.17 ml.
Urinary urea, 800 mg. per 100 ml.
Blood urea, 38 mg. per 100 ml.
Standard maximal clearance per minute,
$800/38 \times \sqrt{1.17}$ ml.,
$=23$ ml.,
$=42$ per cent of normal.

Urea clearance after Urea (Fowweather).

Volume of urine, 110 ml. (Time, 60 minutes).
Volume of urine per minute, 1.83 ml.
Urinary urea, 1400 mg. per 100 ml.
Blood urea, 60 mg. per 100 ml.
Clearance per minute,
$1400/60 \times \sqrt{1.83}$ ml.
$=31.5$ ml.,
$=42$ per cent of normal.

Note:

1. Delayed or impaired concentrating powers; specific gravity and urea percentage.
2. Low total urea.
3. Normal or high water-excretion.
4. First blood values at upper limit of normal.
5. High second blood values.
6. Low clearances; both approximately the same.
7. Obvious nitrogen-retention under load.

I think that the following case illustrates well this slow translation from the post-toxaemic to the secondary hypertensive state.

CASE 2. The patient was a woman aged 31; 2 previous normal pregnancies.

Third Pregnancy.

25th week. Attended hospital with toxaemia; blood-pressure 130/80; slight albuminuria.

27th week. After rest at home; headaches; blood-pressure 144/104.

27th to 32nd weeks. Felt well; no oedema; slow rise of blood-pressure to 150/108.

33rd week. Swelling of hands and feet; blood-pressure risen to 192/118; admitted to hospital.

34th week. Felt well; oedema subsiding somewhat; blood-pressure 160/118.

35th week. Allowed out of bed; blood-pressure immediately rose to 190/118. Three days later the blood-pressure was 200/120.

The membranes were ruptured with a Drew-Smythe catheter. On the following day an assisted breech delivery of a live premature female child was followed 20 minutes after by a single eclamptic fit.

1 day postpartum, blood-pressure 200/120.

1 week postpartum, blood-pressure 160/120.

2 weeks, the patient felt well and was sent home. Blood-pressure 160/120.

4th week. Headaches and dimness of vision. Blood-pressure 198/126.

13th week. Symptoms persist; blood-pressure 184/112.

21st week. Symptoms persist; blood-pressure 186/116.

A renal function test was then done and is shown in Fig. 8.

FIG. 8.

RENAL FUNCTION TEST.

CASE 2. Serial No. 646/43; 21 weeks post-partum.

Urinary Specimens.

Time	Volume (ml.)	Specific gravity	Urea (percentage)	Urea, Total (g.)	Albumin (percentage)
6.50	202	1018	1.8	3.636	0.12
7.50	64	1014	1.1	0.704	0.05
9.00	134	1009	1.1	1.474	0.02
10.00	76	1013	2.0	1.520	0.03
11.05	57	1015	2.2	1.144	0.05

Urea Concentration Test.

Volume of urine secreted in 3 hours after urea, 250 ml.

Weight of urea excreted in 3 hours after urea, 3.918 g.

Average urea concentration, 1.56 per cent.

Blood Specimens.

Blood urea before urea, 34 mg. per 100 ml.

Non-protein-nitrogen before urea, 26 mg. per 100 ml.

Blood urea after urea, 68 mg. per 100 ml.

Non-protein-nitrogen after urea, 48 mg. per 100 ml.

Urea Clearance Test before Urea (Van Slyke)

Volume of urine, 64 ml. (Time, 60 minutes).

Volume of urine per minute, 1.07 ml.

Urinary urea, 1100 mg. per 100 ml.

Blood urea, 34 mg. per 100 ml.

Standard maximal clearance per minute,

$1100/34 \times \sqrt{1.07}$ ml.

$= 33.3$ ml.,

$= 62$ per cent of normal.

Urea Clearance after Urea (Fowweather).

Volume of urine, 76 ml. (Time, 60 minutes).

Volume of urine per minute, 1.27 ml.

Urinary urea, 2000 mg. per 100 ml.

Blood urea, 68 mg. per 100 ml.

Clearance per minute,

$2000/68 \times \sqrt{1.27}$ ml.

$= 33.2$ ml.

$= 44$ per cent of normal.

Note:

1. Moderate albuminuria.
2. Low total urea.
3. Normal first blood values.
4. Raised second blood values.
5. Poor second clearance.

Indicative of post-toxaemic state.

At the 45th week the renal function test was repeated; blood-pressure 176/112 and Fig. 9 shows the beginning of the change from the post-toxaemic to the secondary hypertensive state.

FIG. 9.

RENAL FUNCTION TEST.

CASE 2. Serial No. 2002/43: 45 weeks post-partum; September 28th, 1943.

Urinary Specimens.

Time	Volume (ml.)	Specific gravity	Urea (percentage)	Urea, Total (g.)	Albumin (percentage)
5.0	408	1011	1.20	4.896	Nil
6.0	89	1012	1.30	1.157	Nil
7.0	188	1009	1.05	1.974	Nil
8.0	106	1012	1.70	1.802	Nil
9.0	72	1014	1.73	1.246	Nil

Urea Concentration Test.

Volume of urine secreted in 3 hours after urea, 366 ml.

Weight of urea excreted in 3 hours after urea, 5.022 g.

Average urea concentration, 1.37 per cent.

Blood Specimens.

Blood urea before urea, 41 mg. per 100 ml.

Non-protein-nitrogen before urea, 35 mg. per 100 ml.

Blood urea after urea, 83 mg. per 100 ml.

Non-protein-nitrogen after urea, 54 mg. per 100 ml.

Urea Clearance Test before Urea (Van Slyke).

Volume of urine, 89 ml. (Time, 60 minutes).

Volume of urine per minute, 1.48 ml.

Urinary urea, 1300 mg. per 100 ml.

Blood urea, 41 mg. per 100 ml.

Standard maximal clearance per minute,

$1300/41 \times \sqrt{1.48}$ ml.

$=38.5$ ml.,

$=71.3$ per cent of normal.

Urea Clearance after Urea (Fowweather).

Volume of urine, 106 ml. (Time, 60 minutes).

Volume of urine per minute, 1.76 ml.

Urinary urea, 1700 mg. per 100 ml.

Blood urea, 83 mg. per 100 ml.

Clearance per minute,

$1700/83 \times \sqrt{1.76}$ ml.

$=27.2$ ml.,

$=36.3$ per cent of normal.

Note:

1. Absence of Albumin ? Disappearance of old tubular damage.
2. Increased water-excretion.
3. Improvement in urea total.
4. Good clearance under basal conditions.
5. Poor clearance and nitrogen-retention under load.

After this the blood-pressure steadily mounted to the region of 200/130-40. The next renal function test was done 84 weeks post-partum.

Here the picture of secondary hypertension is nearly complete.

FIG. 10.

RENAL FUNCTION TEST.

CASE 2. Serial No. 1499/44; 84 weeks post-partum; June 27th, 1944.

Urinary Specimens.

Time	Volume (ml.)	Specific gravity	Urea (percentage)	Urea, Total (g.)	Albumin (percentage)
5.0	205	1018	1.2	2.460	0.01
6.0	80	1018	1.2	0.960	0.01
7.0	70	1010	1.2	0.840	Trace
8.0	156	1011	1.4	2.184	Trace
9.0	90	1013	1.6	1.440	Trace

Urea Concentration Test.

Volume of urine secreted in 3 hours after urea, 316 ml.

Weight of urea excreted in 3 hours after urea, 4.464 g.

Average urea concentration, 1.41 per cent.

Blood Specimens.

Blood urea before urea, 46 mg. per 100 ml.

Non-protein-nitrogen before urea, 32 mg. per 100 ml.

Blood urea after urea, 86 mg. per 100 ml.

Non-protein-nitrogen after urea, 55 mg. per 100 ml.

Urea Clearance Test before Urea (Van Slyke).

Volume of urine, 80 ml. (Time, 60 minutes).

Volume of urine per minute, 1.33 ml.

Urinary urea, 1200 mg. per 100 ml.

Blood urea, 46 mg. per 100 ml.

Standard maximal clearance per minute,

$1200/46 \times \sqrt{1.33}$ ml.

$=30$ ml.,

$=55.5$ per cent of normal.

Urea Clearance after Urea (Fowweather).

Volume of urine, 156 ml. (Time, 60 minutes).

Volume of urine per minute, 2.6 ml.

Urinary urea, 1400 mg. per 100 ml.

Blood urea, 86 mg. per 100 ml.

Clearance per minute,

$1400/86 \times \sqrt{2.6}$ ml.

$=42.3$ ml.,

$=56.4$ per cent of normal.

Note:

1. Delay in concentrating (specific gravity and urea percentage).
2. Low total urea.
3. Slightly raised water excretion.
4. Rather high first blood values.
5. High second blood values.
6. Low clearances approximating to the same value.
7. Obvious nitrogen-retention.

It is premature at this stage to dogmatize upon the conclusions one draws whilst seeing so many of these tests. But it is inevitable that one gathers impressions as one goes along I think that these may be summarized briefly.

1. The post-toxaemic state is a real condition and not merely something that exists in a laboratory report.

2. The duration of this state is longer than is generally thought. So far as the cases that I have seen show, it seldom lasts less than 7 months and is usually detectable up to a year.

3. The factors which decide whether the patient makes a good recovery from this condition or passes on to the secondary hypertensive state are probably multitudinous. Possibly the 2 most important are:

(*a*) The amount of rest that the patient can get during the first few months after delivery. War and post-war conditions obviously do not help the unfortunate mothers in this respect. This imponderable aspect will not, therefore, be discussed further.

(*b*) The duration of raised blood-pressure due to the pregnancy toxaemia.

Secondary hypertensive changes following the post-toxaemic state seem to occur far more frequently in those cases where the blood-pressure has remained high and pregnancy allowed to continue in the hope of getting at least one live baby for the anxious mother. The length of time during which the blood-pressure remains high seems to be a far more important factor than the very great heights to which it may rise. The late toxaemic with a very high blood-pressure, culminating possibly in eclampsia may have a prolonged post-toxaemic state, but rarely develops secondary hypertensive changes.

I feel that one must consider this post-toxaemic state more seriously, and it seems to me that there are 2 possible approaches to the problem.

First, in the matter of prevention, one may have to become rather more critical and stringent in the assessment as to whether a patient with toxaemia should be allowed to continue her pregnancy.

Secondly, as to treatment, the possible development of secondary hypertension, approximating as it does in function to chronic nephritis, offers a serious menace to the mother's future health. Whereas there are reasonably adequate facilities for the hospitalization of the pregnant toxaemic, such are almost entirely lacking for the post-toxaemic. To the woman who takes her responsibilities as a housewife and as a mother with any seriousness, the first few months following delivery are very busy and certainly do not provide conditions to promote a fall in blood-pressure. There, therefore, seems to be a very good case for the provision of beds, possibly in a convalescent home, with facilities for the routine check of the post-toxaemic woman and her child, and possibly this lightening of domestic responsibilities would do much to reduce the incidence of the secondary hypertensive state.

In conclusion I would like to express my indebtedness to the medical staff of the Jessop Hospital for Women, from whose case-records I have widely and indiscriminately abstracted the material for this paper.

ERRATUM.

"Riboflavin Deficiency in Pregnancy," by A. BRZEZINSKI, Y. M. BROMBERG, and K. BRAUN. *The Journal of Obstetrics and Gynaecology of the British Empire*, Vol. LIV, No. 2, April 1947, pages 182 to 186.

For riboflavin g *read* riboflavin μg.

Its Relationship to the Course of Pregnancy and to the Condition of the Foetus.

BY

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DURING the past few years considerable attention has been paid to the relation between prenatal malnutrition on the one hand and the complications of pregnancy, labour and the puerperium and the condition of the foetus at birth on the other hand. In these studies it has been shown that pregnancy in women on poor diets is frequently accompanied by obstetrical complications, such as miscarriages, stillbirths and premature deliveries (Ebbs, Tisdall and Scott, 1941; Burke *et al.*, 1943; Burke, Harding and Stuart, 1943a; Stuart, 1945). It has also been claimed that the birth-weight of the infant and its development up to 6 months are influenced by the prenatal nutritional state of the mother (Ebbs, Tisdall and Scott, 1941; Stuart, 1945; Burke, Harding and Stuart, 1943b). The results of large scale investigations, such as those described in the Interim Report of the Peoples' League of Health (1942) in England on 5,022 expectant mothers and those reported by Balfour (1944) on 11,618 pregnant women have also provided evidence as to the harmful effect of malnutrition on the course of pregnancy and the condition of the foetus. Although the influence of diets deficient in calories and various essential nutrients seems to be established, there is insufficient knowledge as to the effect of individual vitamin deficiencies on the pregnant woman and on the newborn child.

During the war years in this country an opportunity to study the clinical syndrome of riboflavin deficiency arose (Dostrowski and Sachers, 1942; Braun, Bromberg and Brzezinski, 1943). This deficiency was especially frequent in pregnant women, and its peculiar clinical manifestations were described in a previous paper (Braun, Bromberg and Brzezinski, 1945). Generally the ariboflavinosis in these women was not accompanied by other deficiency diseases. Furthermore, close relationship was demonstrated between the riboflavin content of the diet, the clinical syndrome and the riboflavin excretion in the urine.

In the present paper the effect of riboflavin deficiency on the course of pregnancy and parturition, as well as upon the condition of the foetus at birth and its further development, is reported. The diagnosis of riboflavin deficiency in this study was based mainly on the amount of riboflavin excreted in the urine.

MATERIAL.

Three hundred and twenty-six women attending the prenatal clinic of the Rothschild-Hadassah University Hospital were studied. In this series the amount of ribo-

flavin in the morning urine was examined twice monthly and at least 6 times throughout pregnancy. According to the average amount of riboflavin excreted in the morning urine, this series was divided into 4 groups:

Group A, up to 100 g. per litre 60 cases
Group B, 100 g. to 200 g. per litre 62 cases
Group C, 200 g. to 300 g. per litre 123 cases
Group D, more than 300 g. per litre 81 cases
325 cases

Two hundred and fifty to 500 g. of riboflavin per litre of urine should be considered as the average amount excreted by normal individuals in Palestine (Bavly, 1943).

In all our patients a complete physical and obstetrical examination was performed and a dietary history obtained. Data were collected as to the social, economic and nutritional status of the patient and her family. The patients were re-examined at least once monthly, when the blood-pressure was taken and the urine examined for albumen. All these patients were delivered in our department and were observed during delivery and in the postpartum period; the newborn children were observed from birth until the age of 6 months.

In the 4 groups the influence of riboflavin deficiency on the course of pregnancy, labour, the postpartum period, lactation, foetal and neonatal mortality and the condition of the foetus at birth and its subsequent development, was investigated.

I. *Course of Pregnancy.*

Pre-eclamptic toxaemia. It has been assumed that toxaemia frequently arises in undernourished pregnant women (Ebbs, Tisdall and Scott, 1941; Brzezinski, Bromberg and Halevi, 1943). This could not be confirmed in our patients suffering from riboflavin deficiency (Table I). The incidence of toxaemia was low in groups A and B. Only 2 women had a slight elevation of blood-pressure during the last month of pregnancy and only 1 of them had albuminuria. On the other hand, in groups C and D 13 patients suffered from pre-eclamptic toxaemia. Three of them had severe forms of toxaemia with high blood-pressure, albuminuria and hypertensive changes in the optic fundi.

TABLE I.
Maternal Complications.

Cases	Patients							
	Group A.		Group B.		Group C.		Group D.	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Toxaemia of pregnancy	1	1.6	1	1.6	7	5.7	6	7.4
Vomiting and nausea	20	33.3	15	24.2	8	6.5	5	6.4
Prematurity	10	16.4	8	12.7	7	5.7	4	4.8
Hypogalactia	20	33.3	15	24.2	7	5.7	5	6.2
Agalactia	4	6.6	2	3.2	–	–	–	–

Vomiting. In groups A and B in which riboflavin urinary excretion was low, nausea and vomiting were very frequent. In group A there were 20 cases (33.3 per cent), in group B, 15 cases (24.2 per cent), while in groups C and D there were 8 and 5 cases respectively (6.5 and 6.4 per cent) (Table I). This hyperemesis, which occurred in the first 2 groups, almost always in the second half of pregnancy, was accompanied by heartburn and should not be considered at a manifestation of toxaemia but rather as being caused by anatomical changes in the pharynx and in the oesophagus due to riboflavin deficiency (Braun, Bromberg and Brzezinski, 1945).

Premature deliveries. Riboflavin defici-

ency seems to play an important role in the premature termination of pregnancy. In group A 10 cases of prematurity (16.4 per cent) occurred; in group B, 8 cases (12.7 per cent), in group C, 7 cases (5.7 per cent) and in group D, 4 cases (4.8 per cent) only (Table I). The number of premature deliveries in the first 2 groups is strikingly higher than that observed in our obstetrical clinics (Brzezinski, Bromberg and Halevi, 1943).

The frequency of other complications such as infections, haemorrhages, etc., was unaffected in the various groups.

II. *Course of Labour.*

No significant differences in respect to labour were found in the 4 groups studied. The incidence of haemorrhages and of instrumental deliveries was equally low in all groups. Since the percentage of primiparae and multiparae was approximately the same in the various groups, this factor does not influence the result of the investigation.

III. *Course of the Postpartum Period.*

In the postpartum period no major complications were observed in our patients: neither was any significant difference noted between the various groups in the frequency of mild infectious complications. The morbidity (including all cases which showed a rise of temperature over 38°C. for 2 days or more during the postpartum period) was equally low in all 4 groups: 8.3 per cent in group A; 8 per cent in group B; 6.6 per cent in group C, and 8.6 per cent in group D.

IV. *Lactation.*

With regard to the amount of milk secreted during the immediate postpartum period as well as the 6 first months following delivery, significant differences were observed between the various groups. In the first group (A) there were 20 cases of hypogalactia, an average amount of 200 g. milk had to be added after each meal. In the same group there were 4 cases of complete agalactia. In the second group (B) there were 13 cases of hypogalactia and 2 of agalactia. In the third group (C) 7 cases, and in the fourth group (D) 5 cases of hypogalactia were noted (Table I).

V. *Condition of the Foetus at Birth and its Subsequent Development.*

The condition of the foetus at birth seems not to be influenced by riboflavin deficiency. The average weight of the newborn at term was nearly the same in all 4 groups. However, the newborn of the first 2 groups (A and B) showed a definite tendency to gain less weight during the first weeks than those of the other control groups. This may be attributed to the artificial feeding which became necessary because of the hypogalactia of the mother in the groups with lower riboflavin excretion. The further development of the infants was also investigated. There were no significant differences during the 6 months following delivery in the 4 groups studied. All infants investigated were observed at the centre for infant care of the Hadassah University Hospital. It appears, therefore, that the antenatal riboflavin deficiency of the mother does not influence the development of the foetus.

VI. *Foetal Mortality.*

Antenatal death. The first 2 groups (A and B) showed a high percentage of foetal mortality during pregnancy. There were 3 cases in group A, 1 in the fifth and 2 in the eighth month. In these cases macerated foetuses were spontaneously expelled. In group B there were 3 cases of macerated foetuses, 1 in the eighth and 2 in the ninth month (Table II). In groups C and D there were no cases of macerated foetuses. It

should be stressed that in all cases of antenatal death of the foetus other causes such as diabetes, syphilis and toxaemia of pregnancy were excluded.

Intranatal death. One infant of group A died of cerebral haemorrhage due to difficulties in delivery.

Postnatal death. During the immediate postpartum period (first 2 weeks) 2 deaths occurred in group A due to prematurity of the infants. Both of them had had very low birth-weights (1600 g. and 1800 g.). One infant in group C died 3 hours after delivery because of asphyxia, and the second child after 4 days of bronchopneumonia (Table II).

TABLE II.
Foetal Mortality

Cases	Patients							
	Group A.		Group B.		Group C.		Group D.	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Antenatal mortality	3	5.0	3	5.8	–	–	–	–
Natal mortality	1	1.7	–	–	–	–	–	–
Postnatal mortality	2	3.3	–	–	1	0.8	1	1.1

COMMENT.

It has been demonstrated in animals that lack of riboflavin in the food may lead to relative sterility and when reproduction was possible, to resorption of the product of conception (Warkany and Schraffenberger, 1944). Evidence is also available that riboflavin deficiency may cause congenital anomalies of the offpring (Warkany and Schraffenberger, 1943; Johnson, *et al.*, 1945). Since diets consumed by human beings are never completely riboflavin free, similar conditions as those observed in the above-mentioned experiments apparently do not occur in man. Therefore, the demonstration of the influence of riboflavin deficiency on the course of pregnancy and foetal development in man is more difficult than under experimental conditions. However, it was possible in this study to observe a series of pregnant women who had a very low riboflavin intake and presented clinical manifestations of ariboflavinosis. This deficiency was confirmed by the low urinary excretion of riboflavin. The purpose of our investigation was to establish the effect of riboflavin deficiency on the course of pregnancy, labour and on the condition of the foetus. We have not been able to observe any effect of riboflavin deficiency on the frequency of toxaemia, infections and haemorrhagic complications, although numerous authors have emphasized the high incidence of these complications in various nutritional deficiencies. On the other hand, vomiting was definitely prevalent in the groups with low urinary riboflavin excretion, probably because of anatomical changes in the upper digestive tract which accompanied the deficiency state.

A significant relationship was found to exist between riboflavin deficiency and the incidence of prematurity. The average incidence of premature deliveries in the groups with low riboflavin excretion was 14.6 per cent, while in the 2 remaining groups it was only 5.5 per cent. Very significant results were also obtained regarding the incidence of stillbirth due to antenatal death of the foetus. In the first 2 groups antenatal death occurred in 4.9 per cent of the cases, while in the other groups there was none at all. It appears also that riboflavin deficiency has a harmful effect on lactation. In group A 33.3

per cent of the cases had hypogalactia and in 6.6 per cent there was complete agalactia. In group B 25.5 per cent had hypogalactia while in group C and group D an average of only 5.9 per cent was noted.

Summary.

1. A series of 326 pregnant women was divided into 4 groups according to the amount of riboflavin excreted in the urine.

2. There was no significant difference between the groups in the incidence of toxaemia of pregnancy, or of haemorrhagic and infectious complications during pregnancy, labour and the postpartum period.

3. A significant relationship was found between low riboflavin excretion in the urine and the following complications:

Vomiting (during the second half of pregnancy), prematurity, antenatal death of the foetuses, hypogalactia and agalactia.

4. Riboflavin deficiency in the mothers had no harmful effect on the birth weight of the infants or their further development.

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Some Factors Causing Difficult Labour in Multigravidae.*

BY

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ATTENTION has been called to the complications which may arise in labour in multigravidae by several authors, and in particular by Robinson (1930), who has written about "The Old Multipara", and by Solomons (1934), who has described "The Dangerous Multipara". These complications may be all the more difficult to surmount because they are often unexpected, and some major catastrophe, such as a rupture of the uterus, or some difficult operation, such as a high craniotomy, may terminate the labour. When difficult or obstructed labour occurs in a patient after a long history of normal deliveries, its explanation is often puzzling, and a series of cases has therefore been investigated in order to determine the factors responsible.

The tables of the obstetric abnormalities and the maternal deaths at Walton Hospital for the years 1936 to 1945 inclusive, have been searched. During this time there were just under 30,000 deliveries. The case histories of all patients who had had a difficult labour in the 8th or in any subsequent pregnancy after a previously normal obstetrical history have been reviewed, with the main object of determining the factors responsible for the gradual or sudden onset of such difficulty. The previous obstetrical history has not been considered abnormal, however, if there was an instrumental delivery in the first labour, if there were occasional instrumental deliveries or stillbirths at home, or if there were difficult labours terminating the 2 or 3 pregnancies prior to the one under consideration. After the 8th pregnancy, according to Kerr (1933), the mortality equals or exceeds that in the primigravida, and in the 10th pregnancy, according to Solomons, the mortality is 5 times that of all women in pregnancy.

It was found that transverse lie with its complications of prolapse of the cord and limbs was a common source of difficulty, and as the explanation of this is usually to be found in the laxity of the abdominal wall after many pregnancies, these cases have not been considered further. In some of these cases, however, the other factors which will be mentioned later are doubtless operative as well. Cases of antepartum haemorrhage have also been excluded, together with those in which difficulty was due to foetal monsters or cervical stenosis from previous amputation of the cervix.

After the exclusion of these cases, there were found to be 23 patients in whom there was serious difficulty in labour after a previously normal obstetrical history, and who merit the description of "dangerous multigravidae". This incidence of only 23 cases among nearly 30,000 deliveries is a small one. Nevertheless these cases are worthy of consideration for several reasons. The maternal risk is high, and there were 3 maternal deaths and 2 cases of rupture of the uterus. Most of the patients needed some form of major interference. The factors responsible for the difficulty in these cases will also be found, to a less marked degree, in other patients

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who have had fewer pregnancies, and this is a matter of some importance at the present moment, when it is very common to have to deal with patients who are pregnant again after a gap of many years. There must also be many other similar cases, which do not figure in tables of abnormalities, in which labour has been long, and perhaps to the patient difficult, but in which spontaneous delivery occurs. Finally, for reasons which will be discussed later, it is probable that this type of case will become rare with the passage of time, and is therefore worthy of consideration while it still confronts us in a formidable manner.

Clinical features. An attempt has been made to follow-up and examine clinically and radiologically all the cases seen in the more recent years of the period, but this was not successful, owing, no doubt, to the disturbance of the war and air raids, and to the heavy family responsibilities of these patients. Only 8 patients attended for further examination.

The average age of all patients was 40. Eleven patients under 40, and 12 patients over 40, 2 of them being 47. These patients, therefore, run both the risks of age and multiparity. The average number of pregnancies in 22 of the patients was 10, though this is probably an underestimate, as some patients with a long obstetrical history become a little forgetful about some of their pregnancies. Four patients had had 12 or more pregnancies. Some difficulty, indeed, has been found in obtaining an accurate obstetrical history from the records, as in many cases the previous labours had been at home and the details were vague. Moreover, the histories had often been recorded soon after the patients had been admitted with obstructed labour, and at a time when they were in great distress.

There were 12 Caesarean sections, 5 forceps deliveries, 2 craniotomies, 2 difficult breech deliveries, and 2 normal deliveries. In most of the cases delivered by Caesarean section the head was above the brim, and there were 2 high forceps deliveries. There were also 2 failed forceps cases, and 2 cases in which there was great difficulty with the delivery of the shoulders.

It is convenient to analyse the factors responsible for these difficult labours by considering respectively the powers, passages and passenger.

Powers. Much stress has been laid on inertia as a factor in slow or difficult labour in multigravidae, and fibrosis in the uterine muscle or shortage of calcium have been considered to be important factors. Assessment of the strength of the powers is always a matter of great difficulty, even when graphic methods are used. It is especially difficult from the mere consideration of case histories, or when the patient has not been seen throughout the whole labour. The strength and frequency of the pains may be judged from the patient's or observer's description of them. They may be judged from their effect on the foetus, the size of the caput, the amount of moulding or overriding, and the signs of foetal distress. It must be remembered, however, that when the cervix dilates up quickly, as it usually does in multigravidae, and the head is high, little caput may form, and there may be little moulding in a large well-ossified head. Finally, the occurrence of a ring or of rupture of the uterus may be looked upon as evidence of excessive uterine activity, excepting, of course, those cases of the silent rupture of an old scar.

It was found that in 15 of these cases there was evidence of strong uterine action as indicated by one or more of the standards just described. In the other 8 cases, the information was inadequate to justify the drawing of any conclusion about the matter. According to the available evidence, therefore, the factor of inertia does not seem to

have been an important one in causing difficult labour. It is true that secondary inertia does often occur in these patients, but this must be looked upon as the breathing space which Nature gives to the patient for rest and to the attendant for taking appropriate action before some major complication occurs. In the words of Leyland Robinson "Unhappily the case may be recognized as a type of primary inertia and treated along expectant lines . . ."

Passages. Bony pelvis. The dimensions of the bony pelvis have been investigated by clinical and radiological methods, and also by measurement of the true conjugate of the brim at Caesarean section or post-mortem examination. The results of clinical examination vary greatly with the personal factor, and in some cases there was disagreement between the findings of different observers. It is the rule in these multigravidae, however, to find that the pelvis can be explored with ease owing to the laxity of the soft tissues and the deficiency of the perineum, but at the same time this ease of examination may give a false idea of pelvic size, and this also applies to examination under anaesthesia.

In 9 cases there was clinical evidence of a small inlet or cavity. In 5 of these cases X-ray examination was carried out, and the radiological supported the clinical findings. In 1 case at Caesarean section, the true conjugate was estimated to be only 3 inches, and in another, at post-mortem examination, it was found to be 4 inches. In 1 case the pelvis seemed to be normal, and in the other 11 cases the clinical evidence was too incomplete for any conclusions to be drawn. Six patients were found to have a lumbar lordosis, and the significance of this will be discussed later. Two patients were described as having low symphyses. No cases of bony outlet contraction were found, and clinically outlet obstruction did not occur, apart from difficulty with the shoulders of big babies.

Radiological investigation of the pelvis is now widely used, and whatever its scope in practice may be, it is generally agreed that it gives us an accurate idea of pelvic size and shape. For the reasons already mentioned, this method of examination was only possible in 8 cases. Three other cases had been X-rayed after delivery some years ago, but as the films were not available for study it has been thought wiser to disregard the findings. A picture of the brim by the Roberts method was taken, and also a lateral one. Outlet films were not as a rule taken, as this method is less reliable, and also because outlet difficulty was not a feature in these cases. A study was made of the antero-posterior and transverse measurements of the brim, the shape of the brim, the appearance of the coccyx and sacrum, and of the angles made by the plane of the pelvic brim with that of the anterior surface of the 5th lumbar vertebra and that of the upper part of the sacrum, as described by Malpas and Hamilton (1939).

Consideration of the measurements of the true conjugate taken in the Roberts films shows that, using the commonly accepted limits, there was 1 case with normal measurements (over $4\frac{1}{4}$ inches), 3 cases of slight contraction ($3\frac{3}{4}$ inches to $4\frac{1}{4}$ inches), 2 cases of moderate contraction ($3\frac{1}{4}$ inches to $3\frac{3}{4}$ inches), and 2 cases of severe contraction (below $3\frac{1}{4}$ inches). Ince and Young (1940) in their radiological study of over 500 pelves in London found no cases of severe contraction, and only 6 cases of moderate contraction. Their measurements, however, were of the obstetric true conjugate, measured in lateral films. The pelves in my series were flattened, the brim index in all cases being below 90, in 3 cases between 70 and 80, and in 1 case below 70. The brim areas were all

below the average found by Ince and Young, and in 5 out of 8 cases below their minimum. A simple method of estimating the pelvic capacity has recently been suggested by Weinberg and Scadron (1946). These authors found that if the sum of the antero-posterior and transverse diameters was less than 23 cm. dystocia was likely. By this standard 6 out of 8 brims measured were found to be small.

The important question of the shape of the pelvis will be discussed later. The average of the angles formed in 7 cases by the pelvic brim and the anterior surface of the 5th lumbar vertebra was found to be 127°, which compares with an average found by Malpas and Hamilton of 136°. The average of the angle formed in 7 cases of the pelvic brim and the first part of the sacrum was found to be 110°. This compares with an average of 100° in 19 other films examined, largely of abnormal pelves, and with an angle of 93° which was found by Ince and Young, their measurement being taken to the deepest part of the sacrum.

Consideration has been given to the possibility that either abnormalities of the pelvic joints or obstruction from the soft tissues might have been causes of difficult labour. It is said that with middle age there is gradual obliteration of the sacro-iliac joints. If this occurs it would limit pelvic expansion during pregnancy, and would also interfere with the alteration of pelvic diameters which follows rotation at the sacro-iliac joints. Unfortunately, it is very difficult to draw conclusions from either clinical or radiological examination of these joints, and it has been impossible to draw any conclusion about the matter beyond noting that no obvious abnormality was found. In 1 case in which a postmortem examination was made, the condition of the sacro-iliac joints seemed within normal limits.

No evidence of dystocia from soft-tissue obstruction was found. In some cases a swollen anterior lip of the cervix was a prominent feature, due doubtless to failure of the lower segment to retract over a high head. Cervical dystocia is rare in multigravidae, apart from those cases where scar tissue from a previous amputation or cauterisation of the cervix causes obstruction. Obstruction lower down in the genital tract is also rare, unless there is present vaginal stenosis from previous sepsis, or a perineorrhaphy has been carried out.

Passenger. The average weight of the babies was 8 pounds 15 ounces. There were 2 babies of 6 pounds, 4 of 7 pounds, 7 of 8 pounds, 5 of 9 pounds, 3 of 10 pounds, 1 of 11 pounds, and 1 of 12 pounds. The average weight is thus seen to be high, and the incidence of giant babies is considerable. In 2 cases there was great difficulty with the shoulders of babies weighing 10 pounds 11 ounces and 11 pounds 13 ounces respectively. Another patient had developed diabetes since her previous pregnancy, and Caesarean section for a baby weighing 12 pounds was required. An attempt was made to investigate the possibility that an increase of weight compared with that in previous pregnancies was a factor, but little accurate information was obtained about this, as in many cases the patients were vague about the matter, and also the alleged weight of babies born at home are notoriously inaccurate. In those cases in which a hospital record of previous weights was available, however, it was found that in 3 there was a definite increase in weight, of between 1 and 2 pounds, and in 3 others there was no increase.

Male babies were predominant, there being 17 of these as opposed to 6 females. Definite information about the actual date of delivery in relation to the expected date

was available in 9 cases. In 1 of these the patient was delivered before term, in 1 case at term, and in the other 15 cases at intervals ranging between 1 and 15 days after term.

There were 1 face and 1 brow presentation, both occurring in cases of contracted pelvis. There were 2 occipito-anterior positions, 4 occipito-posterior positions, 8 transverse heads, 1 breech presentation, and 2 transverse lies. In the other 4 cases the exact position was not noted.

Discussion.

Consideration can now be given to determining the relative part played in the production of difficult labour by the factors which have been mentioned. The difficulties of assessing the strength of the powers have already been discussed, and these difficulties are all the greater when the patient has not been observed for the whole of the labour, but has been admitted as an emergency. Nevertheless, in no case in which adequate information was available did uterine action appear to be defective, according to the standards given. On the other hand, several patients were emphatic in saying, both at the time of the labour and subsequently, that not only were the pains excessive, compared with those of previous labours, but that they felt that even with very strong pains that a normal delivery would not take place.

In the case of the passages and the passenger, however, much more definite information is available, and measurements may be used for the purposes of comparison. In 5 cases the size of the baby seemed to be the important factor, the weights being 9 pounds 13 ounces, 10 pounds 6 ounces, 10 pounds 11 ounces, 11 pounds 13 ounces, and 12 pounds. In 7 cases the main factor responsible seemed to be a contracted pelvis, and in 5 of these X-ray pelvimetry was carried out. In 5 more a small pelvis and a large baby were found, a large baby being here considered to be one of 9 pounds or more. In the remaining 6 patients, none of whom were followed up, there was no obvious cause of difficulty, except that in 2 of them there had been an increase in the weight of the baby compared with previous pregnancies.

The main factors are thus seen to be a small pelvis (12 cases) and a big baby (10 cases), and these findings support the views of Solomons. The incidence of contracted pelvis might have been found to be higher if it had been possible to follow up more of the cases.

There was some evidence, though this was not always detailed, in 10 of the cases that difficult labour was a progressive feature in the patient's obstetrical history, and in at least 7 of these there was pelvic contraction. What is the aetiology of this pelvic contraction?

The theory has been put forward by several authors that minor degrees of osteomalacia occur in this country and give rise to bony changes in the pelvis. Leyland Robinson states " . . . although true osteomalacia is rare in this country, there are minor grades of this disturbance which escape recognition." Browne (1942) states " . . . in the depressed industrial areas of England and Wales it is probable that minor degrees of this disease are more common than is generally supposed." MacLennan (1944), in reporting a recent case of osteomalacia in Glasgow, says " It is conceivable that some multiparous women in whom slight pelvic contraction is discovered for the first time in their later pregnancies may actually be suffering from a mild osteomalacia manifestation rather than the results of old-standing rachitic deformity." In spite of these views, however, there is little positive evidence about the occurrence of mild forms of osteo-

malacia. In India, Green-Armytage (1931) says " . . . in some women in this country minor degrees of osteomalacia may occur in the pelvic bones which obstruct labour." Dutta (1936) says that mild forms are common and difficult to diagnose, and that they may give rise to more trouble than established cases.

It is generally agreed that the severe forms of osteomalacia which occur in India and China and which have been described so excellently in the many writings of Preston Maxwell and Green-Armytage are rarely seen in this country. According to Bulmer (1935), only 12 cases had been recorded up to 1945. Kenny (1944) in the radiological examination of 1,000 pelves in London, found evidence of osteomalacia in only 1 patient, an Indian. MacLennan was able to find only 1 previous case in the records of the Glasgow Maternity Hospital in 30 years. I have been able to trace only 1 case which was admitted to the general wards of Walton Hospital in 10 years. It is unlikely that the extreme forms of this condition escape notice, owing to their marked clinical and radiological features. The evidence that the pelvic contraction in these cases now reported might have been due to a mild osteomalacia will be discussed from the radiological, clinical, biochemical and aetiological aspects, but it must be remembered that the certain diagnosis of this condition may provide great difficulty, and may not be possible without the histological examination of bone.

The *radiological* diagnosis may be made from the lack of density of bone, and from the bony deformities which are produced. The lack of density is relative, and diagnosis by means of this feature is difficult. There was no obvious change in the films examined, and it is probable that marked change only occurs in severe cases and is rapidly followed by bony deformity.

The classical bony deformity of the pelvis in osteomalacia is, of course, that of the " triradiate ", " rostrate ", " beaked ", or " three-cornered " pelvis, which is illustrated in the textbooks and found occasionally in the museums. Maxwell (1930) has detailed the changes in the pelvis, and among these are yielding at the acetabulum, approximation of the ischial tuberosities, and increased concavity of the sacrum with turning forward of the lower end. Osteoporosis in the region of the symphysis, a condition found by Young (1940) in pelvic osteo-arthropathy, has also been described in osteomalacia Little information is available about the early bony changes in the pelvis. Hess (1930), however, describes flattening of the pelvis from the forcing downwards and forwards of the sacral promontory, and other authors have described similar findings.

It has already been shown that flattening was a feature in the pelves examined radiologically, and that there was increased inclination of the sacrum, which in a few cases was marked. Associated with these changes clinically was a lumbar lordosis, a feature sometimes making the induction of spinal anaesthesia difficult, and occasionally also some tenderness over the sacrum. In 6 out of the 8 cases there was some prominence in the region of the acetabulum, or the pelvis was triangular, heart-shaped or android. In 6 cases there was marked curving of the lower sacrum.

The bony changes, therefore, are those which might be expected to occur in a softened pelvis from the transmission of weight through the acetabula, the ilio-pectineal lines, and the sacro-iliac joints to the vertebral column. They differ in degree from the extreme classical changes which are doubtless produced by crumpling occurring with great rapidity in a very softened pelvis, and are somewhat similar to those found in rickets. The original

shape of the pelvis must also affect the nature of the changes.

Clinically, the symptoms of osteomalacia may be very variable, and Green-Armytage describes several clinical types. Important symptoms are those of backache and difficulty in walking. The Chinese name for this disease, according to Preston Maxwell, means "back and thigh pain." Four of the cases followed up had had backache in pregnancy. Other symptoms complained of were that the patient "couldn't walk", "couldn't use her hands", "felt helpless", and was "weighed down". Vomiting and lack of appetite were common complaints. It is interesting to note that tenderness over the costal margins, which is a common complaint in multigravidae in this country, is, according to Preston Maxwell, a symptom of osteomalacia.

Biochemical findings were not available in these cases, and, according to Preston Maxwell, the levels of serum calcium and phosphorus are not necessarily altered in this disease. In 1 recent case, not included in the present series, the serum calcium was 10.6 mg., and phosphorus 3.1 mg. per cent. In the case of osteomalacia in Walton Hospital mentioned above, the figures on several occasions were within normal limits.

The *aetiological* factors now believed to be responsible for the development of osteomalacia are deficiency of calcium, phosphorus and vitamin D in the diet, together with lack of sunlight. Preston Maxwell gives details of the diets of Chinese patients suffering from oestomalacia, and it seems probable that the diets formerly consumed by patients in the depressed industrial areas of this country did not differ greatly from these in their lack of first-class protein, and calcium, phosphorus and Vitamin D, and in their relative excess of cereals. Browne quotes evidence about the shortage of calcium in particular. An intake of 2 pints of milk daily is required to ensure an adequate supply of calcium, in addition to the consumption of other calcium containing foods. An attempt has been made to investigate this matter of diet in the patients who were followed-up. It proved difficult, however, to obtain information on this point. A mother will not admit that she starves herself in order to feed her other children, but it is the belief of health visitors who see these patients in their own homes that even now, when milk is more freely obtainable, patients drink very little themselves during pregnancy, and before the war even less was consumed. One patient admitted that "she never drank milk". Only recently, also, has administration of vitamins A and D become more general.

The economic circumstances of most of these patients were very bad, as their reproductive era had corresponded with a period of great industrial depression in Liverpool. The husband of 1 patient had been out of work for 10 years.

Among other factors investigated was the frequency of the pregnancies in these patients, and it was found that the average interval between pregnancies in cases in which details were available was less than 2 years. Details of lactation were only available in 4 cases, and in 3 of these it was prolonged.

It is interesting to speculate why osteomalacia is so rare in places where rickets is so common, such as Glasgow, in view of their similar aetiology, and this matter has recently been discussed by MacLennan. In Central Europe after the 1914–18 War, hunger osteomalacia, as it was then called, was common under the same conditions which produced rickets. Trousseau (quoted by Bulmer) who first called osteomalacia in 1868 the "rickets of adults", said, "There exists, then, in pregnant women, a certain kind of rickets, of which

osteomalacia may be considered a more advanced degree." Possible explanations may be that the diets in this country are not quite so deficient in mineral salts and vitamins, or that intestinal infection is not so frequent or so severe as in India and China, or on the other hand that there is just sufficient sunshine, to help to prevent the condition, even in our northern industrial cities.

In the small number of patients which it has been possible to follow-up, evidence was found of pelvic contraction with changes similar to those which occur in the early stages of osteomalacia. Many of the patients had had symptoms in pregnancy similar to those suffered from by patients with osteomalacia, and their diets over many years had been deficient in those factors whose shortage is now believed to be mainly responsible for osteomalacia. Clinically, evidence was found that the pelvic contraction had developed late in the patient's obstetrical history, and its progressive nature in some cases was indicated by gradually increasing difficulty in labour. All this evidence seems to support the view advanced by the authors mentioned previously that a mild form of osteomalacia does occur in this country and produce pelvic contraction and difficult labour.

Even if these conclusions about the aetiology of these cases are not correct, there can be little doubt from the evidence presented that in some multigravidae after many normal confinements an often unexpected difficult or obstructed labour may arise, due to disproportion from a small pelvis or a large baby or both.

If osteomalacia is a factor in these cases, it might be held to explain the defective uterine action which is said to occur in these cases from shortage of calcium, but it is interesting to note that both Green-Armytage and Preston Maxwell have found that at Caesarean section in these cases the uterine contractions were very forceful.

The bearing of these findings on treatment may be briefly considered. The classical treatment in this type of multigravida with delayed labour and a high head has always been that of internal version. This may be very easy, owing to the laxity of the abdominal wall and the soft tissues. On the other hand, it must be remembered that these cases are often not seen, or at any rate recognized, till late in labour. In such cases the uterus may be dry, and rupture of the lower segment may occur very easily in these multigravidae. In 1 case in this series such a rupture followed the breech delivery of a large baby. Moreover, the breech extraction may be difficult on account of the disproportion which is present in most cases, and this may only become obvious when attempts are being made to deliver the after-coming head. The old operation of high forceps may occasionally be justifiable in expert hands. Once the head has passed through the brim, the rest of the delivery may be easy. The Kielland forceps is valuable, as the head is usually transversely arrested, and this instrument was used in 1 case in this series. It is advisable to apply the anterior blade by the wandering method, rather than by the classical method of turning it upside down in the lower segment.

Caesarean section is preferable in this type of case, and was the most frequent method of delivery in this series. Nevertheless, it must be borne in mind that these patients are not good subjects for abdominal operations, and especially for general anaesthesia, as the abdominal wall is often thick, pendulous and oedematous. The puerperium is usually stormy, and there was one case of burst abdomen, 2 cases of thrombo-phlebitis, and 1 ventral hernia. The findings of Green-Armytage in India

that in neglected cases of difficult labour a lower segment Caesarean section was safer than a craniotomy must always be remembered, and modern chemotherapy has probably still further decreased the risk of this method of delivery.

It is probable, however, that in time this type of case will become very rare with improved economic conditions, a falling birth-rate, and diets more adequate in quantity and quality.

Conclusions.

(1) A series is reviewed of 23 patients in whom difficult or obstructed labour occurred in their 8th or subsequent pregnancy after a previously normal obstetrical history.

(2) The main factors responsible for the difficulty were found to be a small pelvis and a large baby.

(3) Evidence is brought forward that the pelvic contraction is due to a mild form of osteomalacia.

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THOMAS WATTS EDEN, M.D.

The late Thomas Watts Eden, M.D., F.R.C.P., F.R.C.S., who, until his death on the 22nd September last, was Chairman of the Directors and of the Editorial Committee of the Journal, by his Will gave his Trustees two sums, each of £10,000, free of duty, to found, after the death of his widow, two "travelling" fellowships, the first to encourage the study of obstetrics and gynaecology, the second the study of infancy and early childhood in health and disease (paediatrics).

After the death of the widow these funds are to be transferred, one to the Royal College of Obstetricians and Gynaecologists and the other to the Royal College of Physicians, the President and senior officers of which are (with others) to be the judges in making the awards. Candidates must be graduates of either sex (whether members of the College concerned or not) of not less than 2 years standing of any approved University in the British Empire and Commonwealth.

Each fellowship is for a period not exceeding 3 years and the awards are to be made according to the academic progress of a candidate before graduating and his attainments during the post-graduate period, and will not be made by competitive examination.

After 10 years from the first award the conditions may be varied at the discretion of the judges.

Anuria Following Criminal Abortion

BY

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AND

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THE present communication deals with a case in which changes in the uterus resembling those found in the graver forms of concealed accidental haemorrhage ("uteroplacental apoplexy") were produced by the forcible injection into the birth passages of a mixture of soap and dettol in an effort to produce abortion. The case possesses special interest in that the massive uteroplacental injury so produced was followed rapidly by a breakdown in kidney function with oliguria, azotaemia and death.

CASE REPORT.

The patient was admitted to Hammersmith Hospital on March 16th, 1946. She was aged 31, single and nulliparous, and stated that her last menstrual period was on December 25th, 1945. Previously her cycle had been regular and of the 4/28 day type. The following statement was obtained and was checked in its major details by reference to the abortionist and the patient's mother and fiancé. The patient attempted to procure abortion by repeated douching daily with soap and water over the preceding month in addition to taking calomel and "female pills". Being unsuccessful she made arrangements to visit an abortionist on March 16th—the day of admission. She left home feeling well and went to the house of this person, which was some distance from her home, and there a solution of soap and dettol (2 ounces) with 10 ounces of water was injected at 11 a.m. into the uterus by means of a Higginson syringe with an adapted nozzle adding 2½ inches to its length.

She collapsed immediately and thereafter complained of nagging mesial lower abdominal pain and vomited 3 times. She remained during the day in a more or less collapsed state at the house of the abortionist until 4 p.m., when she was taken home by car. On arrival she was noted to be collapsed.

From the onset of her symptoms till her admission to hospital at 8 p.m., that is during 9 hours, she had passed no urine although she had attempted to do so. There had been no vaginal blood loss.

Condition on admission. March 16th, 1946; 8 p.m. Shocked, restless, and slightly dyspnoeic; pale; temperature 97°F.; pulse 100; blood-pressure 90/75 mm. Hg. Tongue and lips dry.

The abdomen was tender and rigid, especially in its lower part, and a tender mesial swelling was found rising from the pelvis to within about 2 inches of the umbilicus. The catheter removed 3 ounces of urine which was brownish-red in colour. Basal sedimentation rate 8.

An intravenous glucose-saline drip was commenced and replaced by Rhesus negative Group O (IV) blood, 1 pint.

Operation. March 17th, 1946, 12.30 a.m. Laparotomy revealed a few ounces of dark sanguineous fluid in the peritoneal cavity. The uterus was enlarged to the size of an 18 week's pregnancy and had the "apoplectic" appearance found in concealed accidental haemorrhage. The surface was markedly congested and there were numerous scattered petechial haemorrhages on both anterior and posterior surfaces. There were 2 large areas of subperitoneal ecchymoses on the posterior surface, the one near the fundus and the other low down on the right side. The "apoplectic" condition was more emphasized on the right than on the left aspect of the uterus. The right Fallopian tube and ovary were congested, purplish black,

and were regarded as non-viable. The left Fallopian tube and ovary were slightly congested. The extravasation of blood extended along the right broad ligament to the wall of the pelvis on the right side and involved the utero-vesical pouch and the wall of the bladder. Subtotal hysterectomy and removal of the right Fallopian tube and ovary were carried out. It is important to note that the history indicated that these changes in the pelvic organs had evolved during a maximum period of about 13½ hours.

Uterus, Fallopian Tube and Ovary.

Bulky uterus (subtotal hysterectomy) and right Fallopian tube and ovary. The uterus is 15 cm. long, 14 cm. in its anterior posterior diameter and 11 cm. wide. The surface is congested, shows scattered petechial haemorrhages on both surfaces and 2 large subperitoneal ecchymoses on the posterior surface, one near the fundus and one lower down on the right-hand side. The Fallopian tube and ovary (4 × 3.5 × 2.5 cm.) are also grossly congested (Plate I). A sagittal section through

TABLE I.

	Serum			Intake	Urine		
Date	Urea Mgm./100	Chlorides Mgm./100	Potassium Mgm./100	Ml./hour	Output Ml./hour	Urea Mgm./100	Albumen Mgm./100
March 17th	115	—	—	78.0	2.1	193.0	650
,, 18th	119	540	23.6	62.7	0.74	—	—
,, 19th	149	—	—	29.6	1.0	—	325
,, 20th	210	—	—	58.0	1.37	229.5	438
,, 21st	290	473	37.0	59.2	1.0	280.0	425

The patient was restored with a further pint of Group O (IV) Rhesus positive blood and 2 pints of plasma. By 6.30 a.m. on March 17th, the blood-pressure was 100/70 mm. Hg. Prophylactically a course of penicillin, 20,000 Oxford units 3 hourly, was commenced. The patient's blood was Group O (IV), Rhesus positive.

At 10.15 a.m. on March 17th 1½ ounces of blood-stained urine were obtained by catheter. In view of the oliguric state an intravenous drip of isotonic sodium sulphate solution (1 pint) was given and alkalies by the mouth. The general condition of the patient remained moderately good for several days but the oliguria persisted and altogether from the time of the injection of the dettol and soap to the time of death (5¾ days) only 8¼ ounces of urine were excreted. At no time was there oedema.

The data in regard to urine excretion, blood-pressure and the biochemical findings are represented in the accompanying tables (Table 1 and Fig. 1).

The pathological report by Dr. I. Doniach is as follows:

the uterus reveals the following state: There is a generalized congestion of the uterine wall whose veins are distended. The placenta lies closely applied to the anterior wall from the internal os up to the fundus. The sac contains a male foetus. The sac is separated from the posterior wall by peculiar gelatinous material most plentiful near the fundus where it extends to the edge of the placenta. The neighbouring 3 to 4 cm. of fundal portion of placenta is markedly haemorrhagic and friable, but the placenta beyond (attached to anterior uterine wall) appears normal. The fundal portion of uterine wall in direct relation to the junction of haemorrhagic placenta and gelatinous material is soft, pale and extremely friable. The upper posterior uterine wall is swollen, firm and intensely haemorrhagic for a length of 5 cm. —a classical appearance of infarction. The inner lining of the lower part of posterior uterine wall is firm, white and granular. Section of the ovary reveals a large corpus luteum and widespread haemorrhage. The foetus is well developed and preserved. It weighs 110 grams with the cord, sitting height 11.75 cm., crown to heel length 18.25

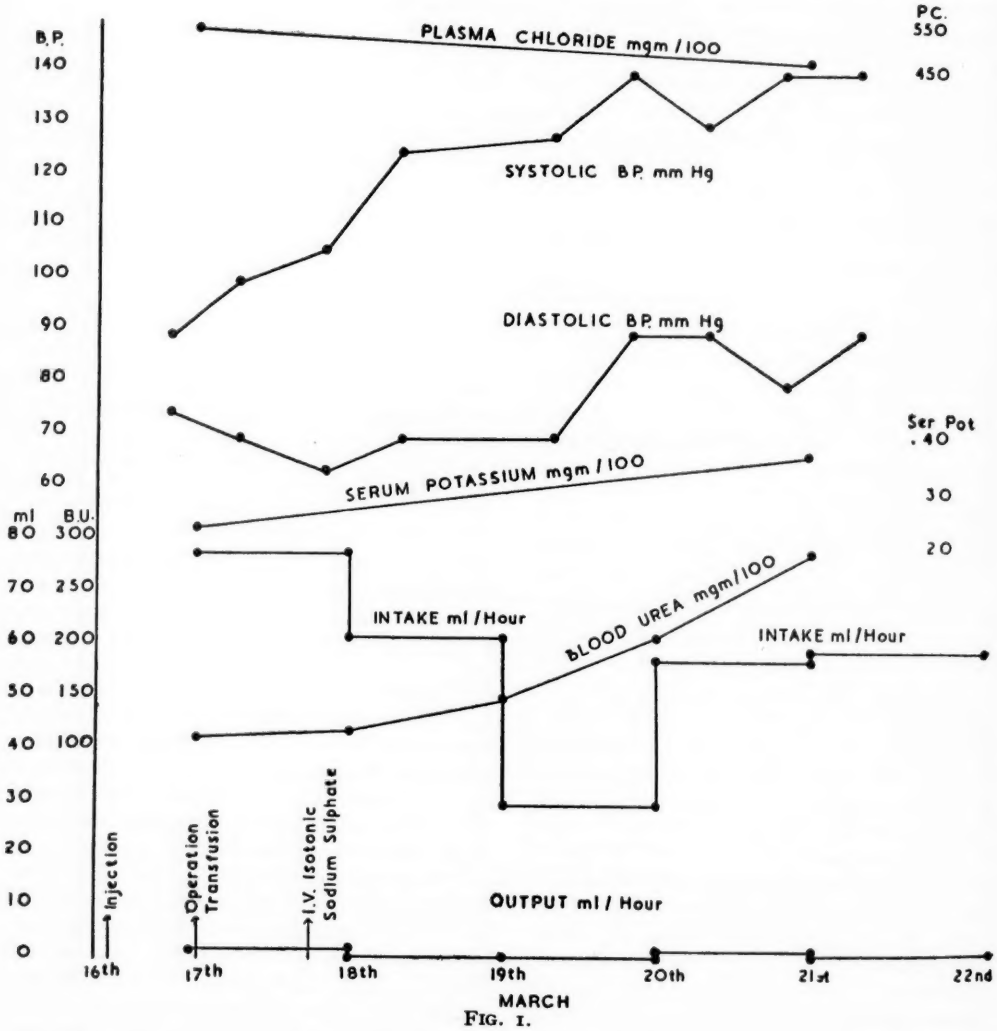

FIG. 1.

cm. These measurements fit almost exactly Streeter's figures of 11.6 cm. sitting height and 108 grams for the average foetus at the end of the fourth lunar month of pregnancy. Professor Plimmer found plentiful fatty acids on analysis of of the gelatinous material and detected an aromatic smell which was not unlike that of dettol. Sections through the fundus show a thin outer rim of surviving uterine muscle fibres traversed by engorged veins; the underlying portion of muscle coat is replaced by an eosinophilic lake of hyaline material richly infiltrated with fatty acid crystals. It may well consist of altered muscle fibres and haemolysed red cells. The veins and arteries traversing this tissue show complete occlusion by granular debris; the arteries being more severly affected than the veins. Interior to the hyaline material lies amorphous fibrillary necrosed decidua. Section through the anterior wall near the fundus shows a similar change in the muscle and in

addition necrotic placenta lining its upper half, living placenta lower down, the demarcation being quite sharp. Similarly there is a sharp demarcation between necrosed and healthy uterine wall. Section of the upper portion of posterior wall shows a large area of necrosed myometrium demarcated from healthy muscle by a layer of polymorphonuclear leucocytes. In the necrotic wall there are partially thrombosed veins lying next to completely occluded arteries. Lower down, the vessels appear quite healthy. This section also shows a clear-cut demarcation between healthy and necrotic decidua parietalis. The picture suggests a local necrosis in the fundus region produced by the inoculum whose fatty acids are well seen in the necrotic tissue and in a few places inside clefts which are probably distended veins. The local arterial occlusion has also probably resulted from direct action of the inoculum. Section of the ovary shows enormous dilation of veins and capillaries and a widespread interstitial haemorrhage of fresh red cells. There are no fatty acid crystals present in the ovary. The haemorrhage can be seen in the corpus luteum and even in the sub-peritoneal collections of decidua cells. The picture in the ovary is one of haemorrhagic congestion such as is seen in torsion of the pedicle.

Kidneys.

The kidneys together weighed 490 grams. Sections show a well-marked separation of the tubules by interstitial oedema. Many glomeruli are funnel-shaped and contain eosinophil debris in their capsular spaces. Many proximal convoluted tubules show cloudy swelling and contain pink circular granular bodies which resemble degenerate cells. Many of the loops of Henle contain pigmented debris (cast material), the wide ascending loops show a regenerated lining epithelium and a lumen plugged by pigmented debris which is covered with a layer of flattened cells. The boundary zone shows numerous interstitial collections of lymphocytes and a few polymorphs gathered round cast containing tubules; and engorged vasae rectae. Many second convoluted tubules show changes similar to that seen in the ascending loops. Only one example was seen of cast material being extruded from a tubule. Benzidine staining shows the pigmented cast material to give a positive reaction for haemoglobin. This is the classical picture of a "transfusion" or "crushing injury" kidney (Fig. 2). The pituitary showed a focus of necrosis in the pars anterior (a few days old). The liver showed centrilobular cell vacuolation.

It is not easy to account adequately for these remarkable changes in uterus and Fallopian tube and ovary. It is likely that the inoculum of soap and dettol introduced under pressure was forced into the large venous channels of the uterus, especially after it had reached and separated the edge of the placenta. It is possible that much of the necrosis was due to the direct action of the inoculum. The extensive haemorrhage into the musculature of the uterus and into areas where it is difficult to conceive that the inoculum could pass, for example, the ovary, may possibly be accounted for by the sudden thrombotic blockage of the main vascular channels, especially of the ovarian system. The marked development of the vessels, with a massive concentration of blood towards the placental area, which occurs during pregnancy, makes it not unlikely that serious and acute interference with one main part of the vascular return may produce rapidly occurring haemorrhage throughout the uterus and the adjacent structures.

However caused it is clear that the uterine changes here produced by an external agency closely simulate those seen in the "utero-placental apoplexy" of concealed accidental haemorrhage. This we know is produced as the result of those factors which commonly operate in diseased states to produce spontaneous abortion (Young, 1942). These factors are not well understood: they may arise from hormonal, nutritional or other causes.

The resemblance between the primary uteroplacental lesion found in this case and that occurring in concealed accidental haemorrhage extends to the renal lesion.

We have elsewhere described the characters of this lesion as found in 3 out of 4 fatal cases of concealed accidental haemorrhage (Young, 1942) and Bratton has reported similar findings (Bratton, 1941; and Young, 1942), (Fig. 3). This lesion is similar to that described by Bywaters and Dible (1942) in the syndrome following crushing injuries and consists of relatively minor changes in the glomerular and first tubular systems and of marked degeneration of the second convoluted and collecting tubules in which blood pigment casts of a granular or crystalline nature are present often in considerable quantity. The other conditions in which this lesion is characteristically found are extensive burns and mismatched blood transfusion and it has been described after obstetrical crushing injuries (Young and McMichael, 1941). The lesion, in other words, is characteristic of a fairly wide generic group typified by massive tissue damage and it has a special interest for us in view of the increasing tendency to regard it as deriving, in those members of the group which have been intensively studied, from toxic materials produced at the site of the tissue damage.

That there exists a genetic similarity between these varied states is suggested by the identity of the essential clinical and pathological phenomena (Table II). There is tissue damage followed quickly by shock, anuria or oliguria, rapidly developing depreciation of tubular function with azotaemia, haemoglobinaemia and haemoglobinuria and, in severe cases, death from the fifth to the tenth day.

It is known that in concealed accidental haemorrhage the kidney lesion may, in rare instances, exhibit the picture of bilateral cortical necrosis. It is possible that the investigations of Trueta, Daniel, Barclay, Franklin and Pritchard (1946) on the renal circulation may have an important bearing on this question. These workers claim to show that under certain conditions, including toxic states, and as the result of an ischaemic process of neurovascular origin, the circulation in the renal cortex can be arrested whilst the total renal blood flow is shortcircuited through the medullary vessels. Such a process might explain not only the anuria and oliguria which constitutes such an important clinical feature of all our cases but also, in the case of persisting ischaemia, of the irreversible changes which culminate in bilateral cortical necrosis.

The study of the experimental animal

TABLE II.

Essential Similarity of Different Anuric States.

	Tissue damage	Shock	Anuria or Oliguria	Azotaemia	Kidney lesion: Tubular degeneration	Kidney lesion: Blood pigment casts
Crush syndrome	Muscle, etc	+	+	+	+	+
Mismatched transfusion	Blood	±	+	+	+	+
Extensive burns	Surface tissues	+	+	+	+	+
Obstetrical trauma	Uterus and pelvic tissues	+	+	+	+	+
Concealed accidental haemorrhage	Placenta, blood, uterus	+	+	+	+	+
Eclampsia	Placenta, blood	±	+	±	±	±

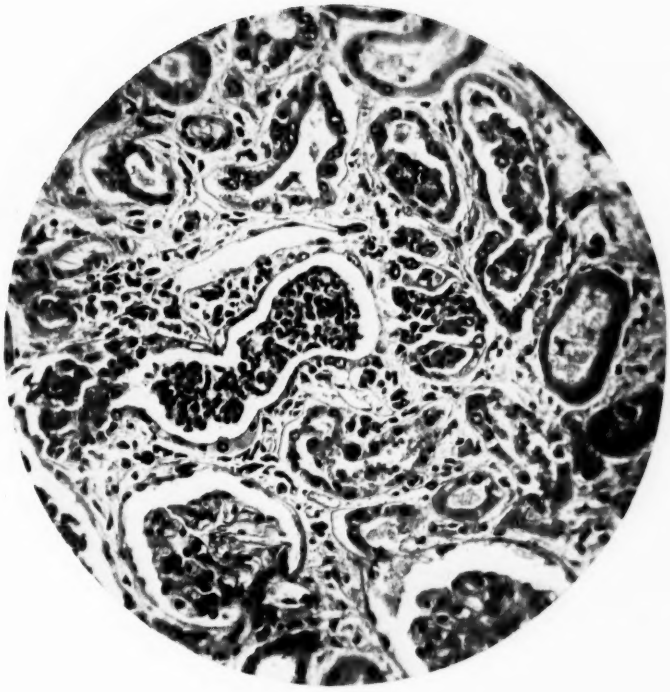

FIG. 2.

Criminal abortion. Anuria, uraemia and death on 5th day. Kidney showing degeneration of the second convoluted tubules with desquamation of epithelium and blood pigment. × 205

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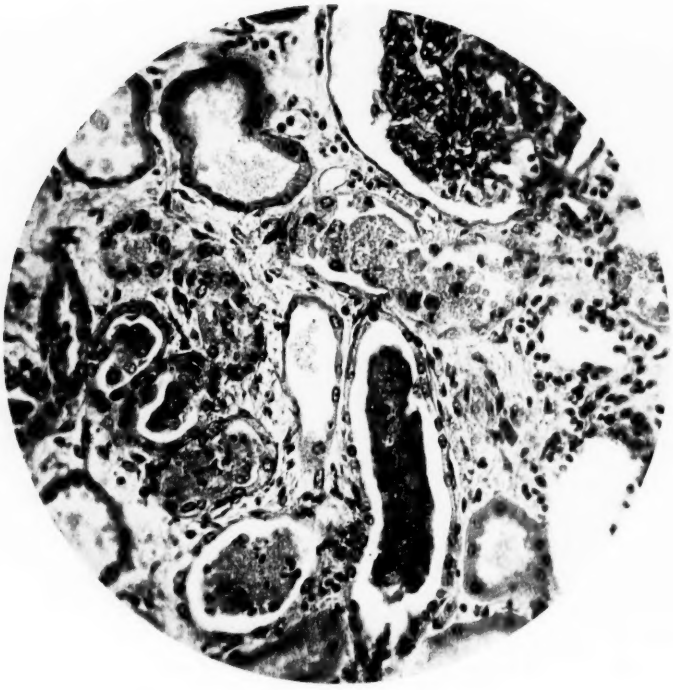

FIG. 3.

Concealed accidental haemorrhage. Anuria, uraemia and death on 6th day. Kidney showing degeneration of second convoluted tubules, desquamated epithelium and albuminous and blood pigment casts. × 205

J.Y.

PLATE I.

Criminal abortion. Showing " apoplectic " condition of the uterus.

J.Y.

has thrown some light on the manner in which the products of tissue damage operate (Eggleton, Richardson, Schild and Winton, 1942; Eggleton, 1944; Corcoran and Page, 1945). This experimental work has consisted in the main in the reproduction of the crush syndrome. The limb of the anaesthetized animal is obstructed for a sufficient time (4 or 5 hours) by a tourniquet. The muscles may be crushed at the same time. Liberation of the tourniquet allows the products of tissue disintegration to escape into the general circulation. This is followed almost immediately by anuria or oliguria and a marked depreciation in urea and creatinine clearance. This lowering of renal function is not due to the "shock" process, which is an invariable accompaniment of the experiment, for it is present when measures are taken to counteract the fall in blood-pressure and to restore the blood volume. The evidence seems to indicate clearly that, whilst the "shock" (with low blood-pressure, massive loss of plasma to the damaged limb and haemoconcentration) may, in the ordinary experiment, partly explain the initial anuria or oliguria on the basis of lowered glomerular pressure, the main and all the irreversible changes are determined by materials escaping from the damaged tissues. The exact nature and mode of production of these substances is not known. There is evidence that the anuria is due to renal ischaemia with, perhaps, as contributing factors tubular blockage from blood casts and debris. In the opinion of most observers it is necessary to postulate also a direct toxic action on the tubules (haematin, breakdown products of tissue protein).

Intravascular Haemolysis.

The part played by intravascular haemolysis in the causation of the renal lesion has been variously interpreted. Common to all the anuric states it seems to be the sole factor in mismatched transfusion. For this reason the question naturally arises as to how far it may be of primary importance. To this the available evidence does not provide a clear answer. Simple blockage of the tubules by the blood pigment is not a sufficient explanation of the anuria for this is present when the blood casts are at a minimum. Even in the case of mismatched transfusion it would seem that a nephrotoxic action must be postulated for in man haemoglobin itself liberated into the blood stream as in proxysmal haemoglobinuria or by injection does not produce anuria.

There is no evidence to incriminate the blood transfusion given in the case under discussion. It is clear that the kidneys were gravely embarrassed before the first blood was administered. During the 9 hours following the injection of the dettol-soap mixture only 3 ounces of urine were excreted and we may assume that this took place during the earliest phase.

Pre-eclampsia and Eclampsia.

Whilst the pronounced renal lesion distinguishes the toxaemia of concealed accidental haemorrhage from that typical of the eclamptic state, there is evidence that these two states may have a common genetic background. This is exemplified in the frequency with which they occur in combination. It is common knowledge that a pre-eclampsia may terminate in concealed haemorrhage and that in eclampsia the placenta after delivery may exhibit a large retroplacental haematoma. Moreover the long recognized association of intravascular haemolysis and haemoglobinuria with eclampsia, and the frequent pigment deposits in the tubules of the eclamptic kidney serve to forge further links between

eclampsia and those toxic states which are due to the liberation into the circulation of the products of tissue damage. Since Schmorl (1893) described yellow pigment in the collecting tubules of the eclamptic kidney a number of authors on the Continent and in this country have described similar appearances, sometimes with tubular degeneration and necrosis (Brütt and Schumm, 1918; Fahr, 1924; Seitz, 1927; Dunn and Baird, 1933; Spitzer, 1934; Bratton, 1941; Young, 1942). At the same time these appearances are neither so prominent nor so frequent in eclampsia as in the other states referred to. The total phenomena are in keeping with the view that whilst there runs throughout the varying phenomena a common genetic thread the modes of expression differ with the differences in the basic lesion.

In eclampsia, as we have shown in previous communications, there is a massive placental lesion involving from one third to one half of the organ. This is easily recognisable in those cases where there is time for its evolution into visible form, that is where the eclamptic seizure is followed by the intrauterine survival of the foetus. On the other hand where, as is usual, foetal death or delivery occurs within a short interval, there may be no conclusive naked eye or even histological evidence of this ischaemic lesion. These observations we have regarded as in keeping with the conception of a placental poison produced during the earlier stages of the disintegration of the damaged organ (Young, 1914, 1942). The discovery that in the ischaemic limb of the experimental animal the toxic materials are produced within a few hours lends support by analogy to such a conception. It finds further evidence in its favour in the conditions obtaining in the human experiment which forms the subject of this communication.

We are indebted to Miss J. Dewe, artist to the British Postgraduate Medical School, for the preparation of the coloured plate, and to Mr. E. V. Willmott, A.R.P.S., head of the Department of Photography in the British Postgraduate Medical School, for the microphotographs.

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Combined Anterior Pituitary Necrosis and Symmetrical Cortical Necrosis of the Kidneys following Accidental Haemorrhage

BY

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DETAILS of a case of necrosis of the anterior pituitary and symmetrical cortical necrosis of the kidneys and of cases of cortical necrosis are submitted because of the rarity of both these conditions and therefore of the need to report such information as becomes available.

CASE 1. 3859/43, K. J.

An unmarried girl, aged 15 years 10 months, a primigravida with an uneventful previous medical history. First day of last menstrual period, February 1943, first week. Expected date of confinement, November 1943, second week.

Although she knew herself to be pregnant she had not made preparations for her confinement or had any ante-natal supervision. She is said to have been quite well until September 16th, 1943, when she had a fall. This not very serious accident was followed, within an hour, by vaginal bleeding which continued intermittently for another hour. Bleeding then ceased but began again later in the evening, accompanied by pains in the "pit of the stomach". These pains became rhythmical in character, occurring at intervals of 5 minutes, and she now thought she "might be aborting". She therefore came to hospital in the early hours of the morning of September 17th.

When seen at 3 a.m. her condition was poor, her colour was bad with the pallor of shock or possibly blood loss and she was obviously anxious. Oedema of the legs was present to the level of the knees and the face was markedly puffy. She was well developed and well nourished.

Cardio-vascular system. Heart not enlarged, pulse poor in volume, rate 110. Blood-pressure 110/65.

Abdomen. Enlarged to the size of a 36 weeks' pregnancy, the uterus palpable as a hard, tense tumour. Foetal parts could not be identified nor was the foetal heart heard. On rectal examination the cervix could be identified one finger dilated, with the vertex presenting.

Uterine contractions were occurring at intervals of 10 minutes. There was slight continuous bleeding *per vaginam*. A provisional diagnosis of toxaemia of pregnancy with accidental haemorrhage was made.

Treatment and progress. As the accidental haemorrhage had now become revealed it was hoped that there would be spontaneous delivery as uterine contractions were occurring regularly.

At 9.30 a.m. there had been little change in her condition, but uterine contractions were beginning to decrease in intensity and frequency. The uterus had not appreciably increased in size and although still tense could not be described as "woody". Labour ceased for some hours during the afternoon, but pains returned with markedly increased severity at 5 p.m. At 6 p.m. her pulse was 136 and her blood-pressure had fallen to 98/76. The cervix was now fully dilated and the small foetal head well down in the pelvis. At 7.30 p.m. she was delivered spontaneously of a macerated female foetus weighing 4 pounds 7 ounces, and measuring 19 inches in length. The placenta and membranes were expelled at 8 p.m. There was no excessive loss during delivery, but about 10 ounces of blood and clots were expelled with the placenta, which showed numerous infarcts. Blood clot was adherent to the maternal surface of the placenta. Labour had lasted approximately 24 hours.

Subsequent progress. Following delivery her condition showed some improvement and she took

fluids well and slept during the rest of the night without drugs. During the 24 hours she passed 900 ml. of urine.

On September 18th she complained of drowsiness, and during that 24 hours passed only 90 ml. of urine, although she still took adequate fluids by mouth. The subsequent fluid intake and output are indicated in the accompanying chart, Fig. 1, and show the sudden and pronounced oliguria. The haemoglobin on September 20th was only 22 per cent and the blood urea 184 mgm./100 on the following day.

From the 21st, there began a rapid deterioration in her condition, the blood urea had risen to 216 mgm./100 on September 24th, and she died the following day.

Throughout her illness and in spite of the very high blood-urea estimations, her mental condition remained clear. She was drowsy but could be roused sufficiently to carry on intelligent conversation.

Treatment had consisted of the administration of adequate fluids, particularly glucose, which she took well. The oedema of the legs present at the

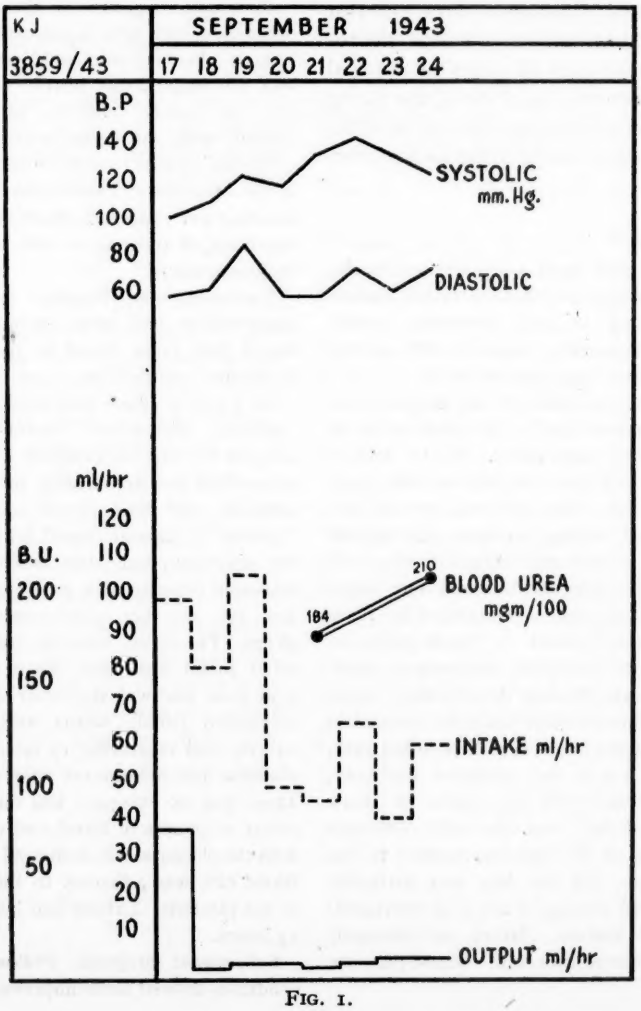

FIG. 1.

time of admission gradually disappeared, but the puffiness of the face persisted. This was the only obvious sign of fluid retention.

Postmortem examination was carried out on September 26th, and the following conditions were observed.

Kidneys. Both kidneys were enlarged and the cortex, apart from a narrow subcortical area of normal tissue, was entirely necrotic and structureless, the appearance typical of symmetrical cortical necrosis.

Liver. Not grossly abnormal.

Thyroid. Enlarged, but not abnormal.

Pituitary gland. Necrosis of anterior lobe.

Microscopical examination of sections of the kidneys showed typical and extensive cortical necrosis.

The pituitary gland showed "complete necrosis of the anterior lobe cells, with the exception of a small area anteriorly". The sections were examined by Professor Payling Wright, who commented that this form of necrosis was not uncommon in conditions of haemorrhage but not, as far as was known, previously reported in association with cortical necrosis. The extent of the necrosis is shown in Fig. 2, and is identical in type and appearance with that reported by Doniach and Walker (1946).

Discussion.

In considering this case, which was observed some 2 years before that described so completely by Doniach and Walker, the many points of similarity between the cases are at once apparent, and are shown in tabulated form in Table I.

Two similar cases are described by Hügin (1946).

The first is that of a 5-para, aged 35 years, in whose obstetric history was known evidence of toxaemia—oedema of legs in a pregnancy 11 years previously, followed by "kidney disease" in the puerperium, and hypertension (blood-pressure 160/90) in a pregnancy 2 years before that under review. In the pregnancy described, the patient is said to have been "well, and less tired than in previous pregnancies but some dyspnoea on exertion and occasional headaches and spots before the eyes, swollen ankles and itching of the hands, especially during the last weeks" are reported. Severe pain followed by vaginal bleeding occurred during the night

Table I.

	Doniach and Walker	Grasby
Duration of pregnancy	28–30 weeks	28–30 weeks
Blood-pressure:		
Maximum	155/95	150/80
Minimum	130/80	110/65
Albuminuria/1000 ...	7.5	8
Oedema	Legs and face (slight)	Face, legs and lower abdomen (slight)
Shock	Severe	Severe
Haemoglobin gm. per cent	5	3
Blood urea, mgm./100	106–216	182–216
Lactational changes	nil	nil
Death-day of illness	7th	7th

and on admission to hospital her condition was grave. Only a few ml. of pale urine were obtained by catheterization. Foetal heart sounds were not heard. Hysterotomy was performed and separation of a normally situated placenta discovered. The placenta showed numerous infarcts. There was complete anuria after operation, in spite of bilateral renal decapsultation, and death occurred 7 days later with a mounting blood urea. Postmortem examination revealed the typical changes of symmetrical cortical necrosis, necrosis of the anterior pituitary cells, the gland showing an apparent attempt at new formation of capillaries and thrombosed vessels, but without changes in the vascular wall which were found in other organs, notably the kidneys. The liver showed the changes of eclampsia, while the breasts showed lactational changes.

The second case is that of a primigravida aged 29 years, with no previous history of severe illness or abortions. Two antenatal examinations revealed no abnormalities. Severe epigastric pains occurred without warning and were followed by the cessation of foetal movements, the onset of abdominal pains and regular contractions. The patient was unable to void any urine. Vaginal bleeding then followed, the pains diminished and she fell asleep, only to be interrupted by sudden eclamptic convulsions. A recently dead foetus was extracted with forceps, the placenta showing "extensive infarcts". Decapsulation of the kidneys was performed for complete anuria and the patient died on the 15th day after delivery. Postmortem examination showed the typical changes of symmetrical cortical necrosis, necrosis of the cells of the anterior pituitary—"not a nucleus visible" —and eclamptic changes in the liver. The kidneys also showed "nephrosis and haemorrhagic nephritis, with extensive cast formation and fatty degeneration". The blood urea is given as 300 mgm./100.

Unfortunately the brief reports of these cases do not give the blood-pressure readings, haemoglobin or biochemical findings. The summary of the pathological findings is given as "eclamptic necrosis of the liver, softening of the brain substance, cortical necrosis of the kidneys, necrosis of the anterior pituitary and intrauterine death of the foetus. The changes were not so marked in the second case, i.e. the renal vessels were hardly changed, there were no thromboses, and although there was haemorrhagic necrosis of the anterior pituitary there were no proven changes in the walls of the vessels or thromboses".

In these 4 cases—the first to be recorded —those described by Hügin show interesting variations, notably the previous history in each of his 2 cases of pregnancy toxaemia and the postmortem eclamptic changes, confirmed microscopically in the liver. No such changes were demonstrated in the case reported by Doniach and Walker nor in the case above described. A further interesting feature is the report by Hügin of apparent attempts at "reorganization" in the pituitary and, in the second case, an apparently less severe degree of necrosis, coincident with a longer period of survival after the onset of acute symptoms of retroplacental bleeding.

Variations in the severity and rapidity of onset of symptoms of pituitary insufficiency following postpartum haemorrhage are well recognized, from the slowly developing condition originally described by Simmonds (1914) to the mild types of pituitary emaciation described by von Bergmann (1934) and others. Sheehan (1938; 1939) who particularly investigated and described postpartum pituitary necrosis considered the thrombosis of the vessels due to the haemorrhage and collapse during delivery but that recovery was pos-

sible in the less severe cases. Recovery is in fact accelerated by the occurrence of a subsequent pregnancy. Sheehan and Murdoch (1938; 1939) have reported not only symptomatic improvement but, in a patient (Case 5) who was given intensive hormonal therapy (gonadotrophic and oestrogenic) to render pregnancy more probable and who did become pregnant, immediate and subsequently permanent improvement of the pituitary insufficiency. It is suggested that this improvement is due to the physiological hypertrophy of the remaining undamaged anterior pituitary cells occasioned by the subsequent pregnancy.

Such possible variations in the degree of pituitary necrosis may explain the less extensive disease and evidence of lactational changes in the cases described by Hügin. Similar variation in severity is recognized in symmetrical cortical necrosis, which, as Doniach and Walker point out in their detailed review is explicable by a relatively simple pathology—reflex vasoconstriction following severe haemorrhage in an already anaemic patient, leading to vascular degenerative changes and thrombosis—which can equally well be applied to explain the pituitary necrosis.

Details of 2 cases of cortical necrosis are reported to illustrate less severe degrees of the condition.

CASE 2. 4966/43 N.A.

Married, aged 40 years; 5-para; the last pregnancy terminated in miscarriage at the 28th week, no cause being known. She had not had antenatal supervision in any of her pregnancies, which had been normal, and there was no history of serious illness.

First day of last menstrual period not known, but was early in May 1943. Expected date of confinement early February 1944.

The patient stated that the pregnancy had appeared to be quite normal until December 3rd, 1943, the day before admission to hospital, when "she started losing". There was no pain with this haemorrhage, but she thought she may have lost almost 10 ounces of blood. She did not look upon this as particularly serious and did not call in her doctor until the following day. Information could not be obtained as to her previous condition or blood-pressure.

On admission to hospital on December 4th, 1943, the patient was well nourished; good build; mucous membranes very pale; general condition fair; no shock; oedema of legs as high as the knees.

Cardiovascular system. Heart normal in size, no bruits; blood-pressure 190/140.

Respiratory system. No abnormalities discovered.

Urine. Albumin, plus 3 (9/1000 in Esbach).

Abdominal examination. Immediately below the umbilicus was a small haematoma of the abdominal wall, 1½ by 1 inch in size, and apparently quite superficial. The patient believed it had appeared the previous day. The abdomen was enlarged to the size of a 36 weeks' pregnancy, the uterus on palpation being hard, tense and tender. There was no area of localized tenderness. Foetal parts could not be identified nor could any foetal heart be heard. Contractions of the uterus could not be felt and the patient did not appear to be in labour. On rectal examination the os could be felt undilated. There was a continuous slight haemorrhage from the vagina, which had continued since the first haemorrhage on the previous day. A diagnosis of toxaemia with accidental haemorrhage (mixed) was made.

Treatment. The membranes were ruptured and 15 ounces of clear liquor amnii were run off without difficulty and without discomfort to the patient. A course of injections of pitocin 2 units every half hour was also commenced and continued for 5 injections. Good uterine contractions ensued with no increase in the amount of blood loss from the vagina.

At 9.30 p.m. she was delivered spontaneously of a macerated male foetus weighing 2 pounds 9 ounces, and measuring 14 inches in length, corresponding with a 29 weeks pregnancy. There was no bleeding with the delivery of the foetus. The placenta and membranes were delivered intact half an hour later, and were accompanied by 12 ounces of dark blood and old blood clot. The uterus contracted well after delivery and the patient's

condition at the end of the third stage was quite satisfactory. Temperature 98°F., pulse 100; respiration 20.

The placenta was found to contain numerous small infarcts and much old blood clot adherent to the maternal surface. The retroplacental haematoma had not ruptured into the amniotic cavity.

Subsequent progress. The patient's condition on the following day, December 5th, was quite satisfactory. The blood-pressure was 160/100, there had been no bleeding during the night and she had passed urine on 2 occasions.

On December 6th, she appeared rather drowsy, her tongue was dry and coated, and she did not appear as well as was to be hoped. During the 24 hours she passed 450 ml. of urine only and this oliguria was particularly noted because she had taken fluids well. The blood urea was estimated and found to be 232 mgm./100.

The fluid intake and output and the blood urea estimations are recorded for convenience in a chart (Fig. 3), and show a progressive oliguria and rising blood urea, with fluid retention until December 16th, when there commenced a sudden polyuria. This markedly increased urinary output continued, with, however, a gradual fall in total fluids excreted until December 27th, when she again passed large quantities of dilute urine. She was by now unfortunately incontinent and exact measurement of the amounts was impossible. This second polyuria coincided with a remarkable fall in the blood urea.

The following are abstracts from the day to day records:—

7.12.1943. Intravenous dextrose 10 per cent, 550 ml.; intravenous dextrose 25 per cent, 10 ml.

8.12.1943. Drowsy, but quite rational and taking fluid well. Oedema, plus 3; fluid output, 230 ml.; blood-pressure, 210/130; haemoglobin, 35 per cent; intravenous dextrose, 50 per cent, 60 ml.

11.12.1943. Some improvement in general condition, patient talking and quite rational. Taking fluids well but fluid output less than 300 ml. for 3 days. She passed no urine during the last 24 hours. No oedema. Blood urea 312 mgm.5/100; blood-pressure, 200/120.

13.12.1943. Condition not so good. There has been a return of the odema, and although she is completely rational she is obviously uraemic, with gasping respiration, lack of interest in her surroundings, and severe skin irritation. Blood-pressure, 196/130; blood urea, 496 mgm./100; urine urea, 1,480 mgm./100; standard urea clearance 3.9 per cent average normal.

15.12.1943. Blood urea 408 mgm./100; condition much worse.

16.12.1943. Sudden polyuria; output 1,700 ml. in 24 hours; blood-pressure, 130/90; outlook seems more hopeful.

17.12.1943. Still maintaining a good fluid balance, but there is no improvement in her condition. No oedema.

20.12.1943. She is still drowsy, disinterested, pale and now beginning to look cachetic. The skin irritation persists. Intake and output approximately equal at 1,400 ml.; blood-pressure has risen from 140/95 to 170/105.

21.12.1943. Blood urea, 932 mgm./100; urine urea 1,720 mgm./100; urea clearance 3.2 per cent average normal.

22.12.1943 to 2.1.1944. Gradual deterioration in patient's condition. Still passing from 1,000 to 1,500 ml. dilute urine, specific gravity c. 1008, and taking fluids quite well. Her mental condition is getting confused and although she recognizes people around her she is roused only with an effort. Towards the end she became incontinent, but the polyuria was even more marked.

On December 26th she passed 400 ml. urine which contained one third part by volume of pure pus. Until then the urine had contained no pus cells but occasionally a trace of albumin. Cause for this pus was not discovered.

On December 29th the blood urea was 464 mgm./100; but there was no improvement in her condition and she died on January 2nd, 1944.

Treatment during this period was purely symptomatic.

Microscopical examinations of the urine during the course of the illness revealed red blood corpuscles and granular casts on 2 occasions only, namely the second and third days of oliguria.

A postmortem examination was made and revealed the typical kidney damage associated with symmetrical cortical necrosis confirmed by microscopical examination. Other organs were not grossly abnormal and there was little evidence of toxaemia of pregnancy. The uterus was not infected.

In reporting on the sections Dr. de Nevasquez

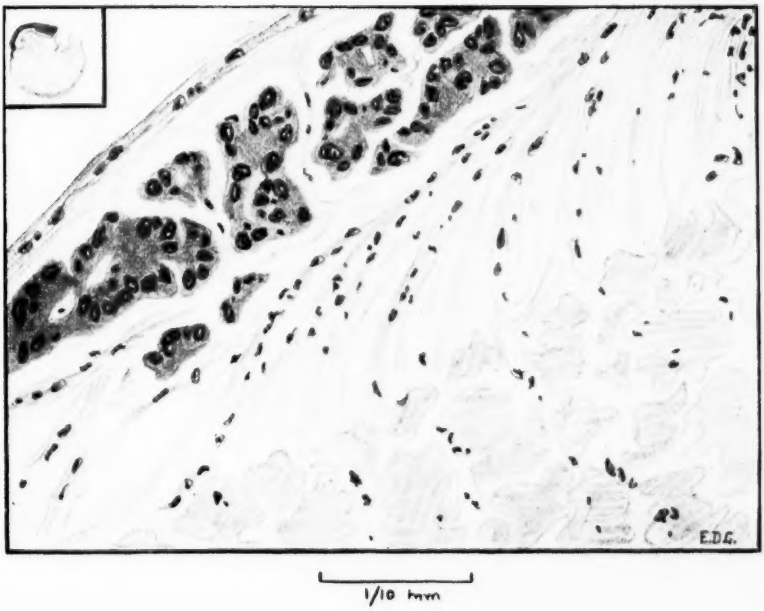

FIG. 2.

Necrosis of anterior pituitary gland, the few remaining undamaged cells are shown to the left, the necrotic tissue to the right. *Inset*: Drawing to show the exceedingly small fringe of remaining healthy tissue in the pituitary gland (shaded dark in the upper left quadrant).

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noted that although the kidneys showed typical cortical necrosis the extent of the lesion was rather less than that usually seen.

Other features of particular interest in this case were the evidence of arterial spasm to which

CASE 3. 2506/45, R. P.

This patient was a 2-para and did not give any history of illness or abnormality in either of her previous pregnancies. Her previous medical history was equally uneventful.

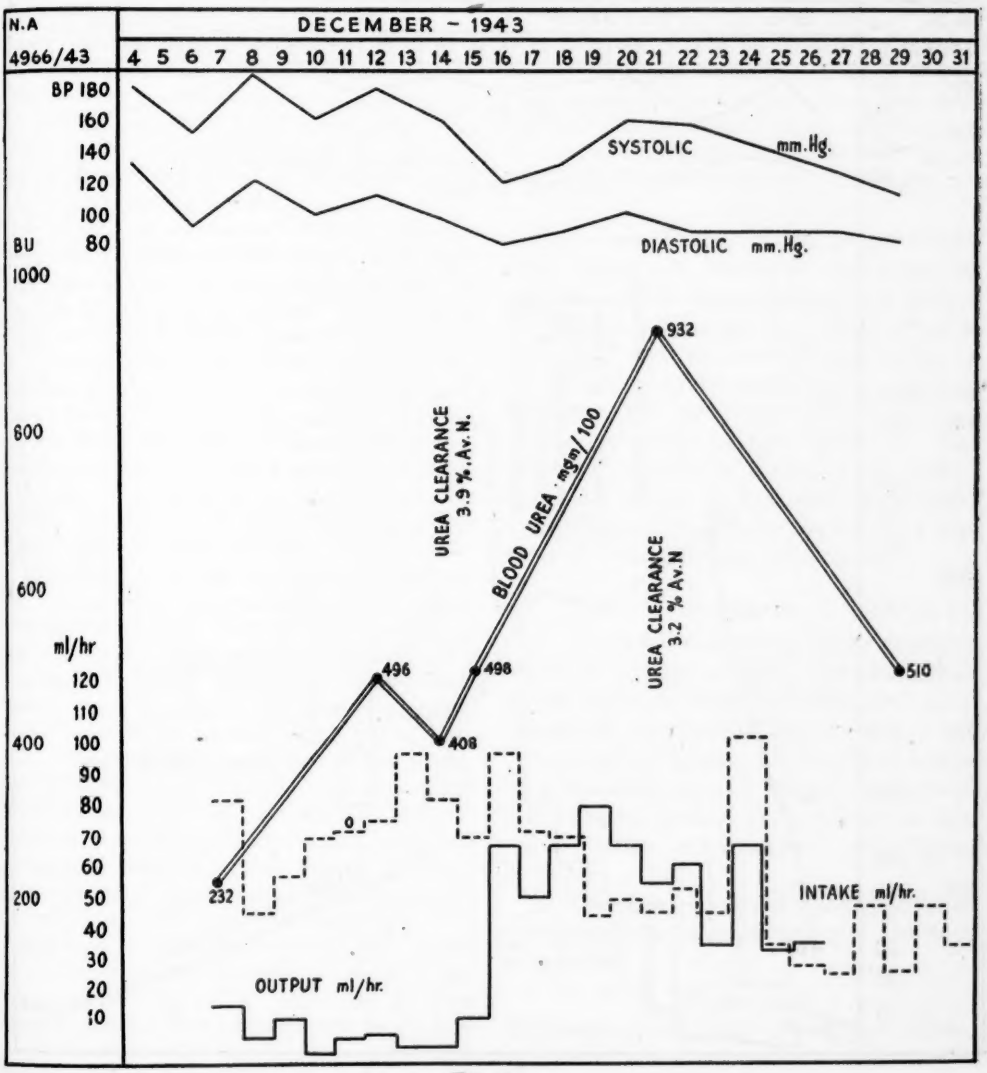

FIG. 3.

Doniach and Walker specifically draw attention, the severe anaemia and the unusually high blood urea.

First day of last menstrual period was early in March 1945. Expected date of confinement about second week December 1945.

She had had no antenatal supervision but stated she had been well until October 5th, 1945, when she had an attack of vomiting associated with epigastric pain. The pain became worse and she was seen by her doctor on October 7th when the pain was severe in the abdomen and back. Her blood-pressure was then found to be 160/110 and the urine found to contain a trace of albumin. She was admitted to hospital with a tentative diagnosis of accidental haemorrhage and toxaemia.

On admission to hospital on October 7th, 1945, her condition was very shocked and pale. Pulse poor in volume; rate below 105. Generalized oedema; blood-pressure, 110/90; urine contained albumin, heavy cloud. The uterus was enlarged to correspond with a 32 weeks' pregnancy. It was

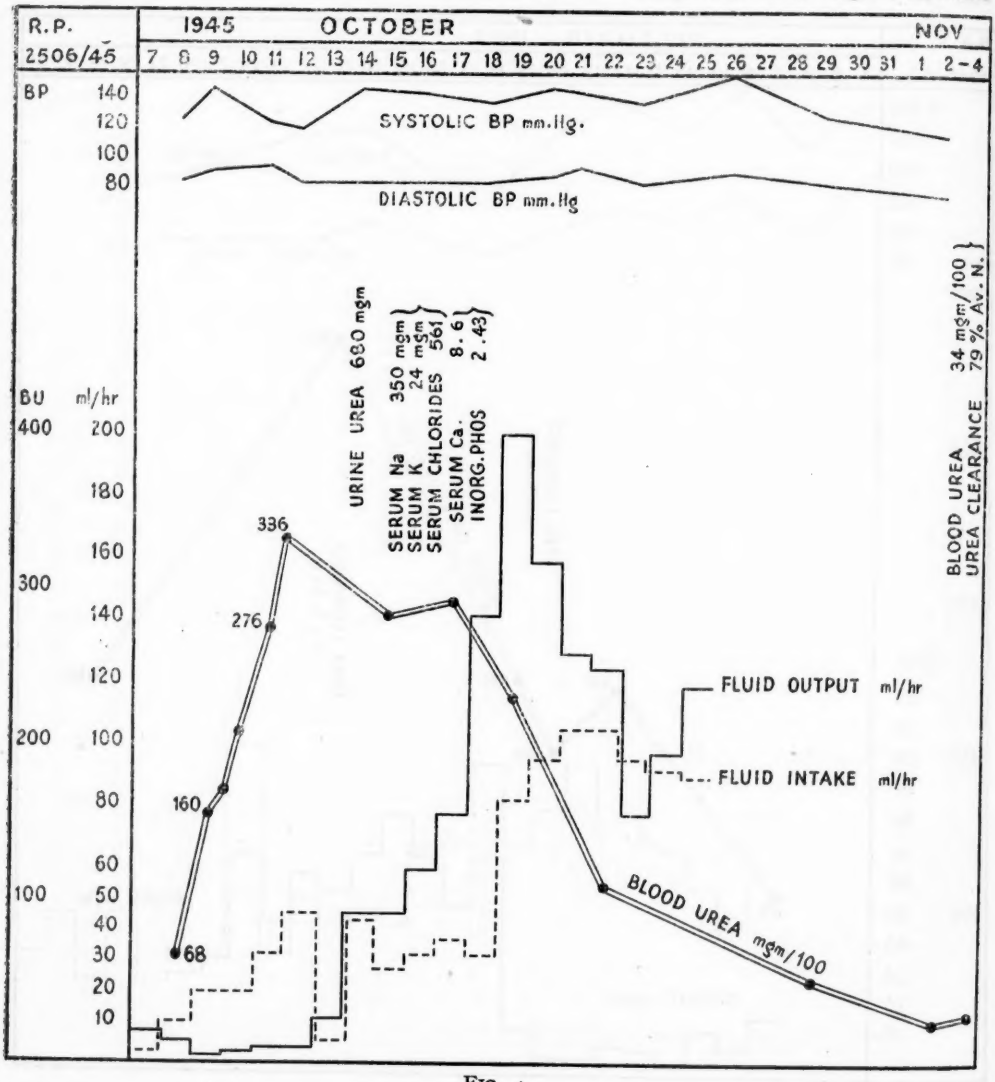

FIG. 4.

tense and hard, and tender. Foetal parts could not be palpated nor could the foetal heart be heard. There was a slight loss *per vaginam*.

In the belief that there had been a considerable intrauterine haemorrhage a blood transfusion of cross-matched blood was given, and later in the evening the membranes were ruptured.

On the following morning she expelled a macerated male foetus of about 28 weeks' duration. The placenta and membranes were expelled complete and without further haemorrhage, the placenta showing multiple infarcts and some old blood clot adherent to the maternal surface. The uterus contracted well and her general condition was much more satisfactory. The blood-pressure was 130/90. She had not passed urine since admission and at 10-30 p.m. she was catheterized and 70 ml. of urine withdrawn. There was no blood in the urine. It was decided, because of the oliguria, to give 370 ml. of 50 per cent glucose solution intravenously. On October 9th catheterization yielded 15 ml. of urine containing albumin but no blood. The oedema persisted and there was now papilloedema of the fundi, more marked in the right disc. She was given 50 ml. of 50 per cent glucose intravenously followed by 1,100 ml. of 3.4 per cent sodii sulph. solution.

On October 10th there was, perhaps, slight improvement although she was drowsy and the oedema remained unchanged. Catheterization yielded 25 ml. of urine containing no obvious blood and only occasional red blood corpuscles on microscopical examination. The oliguria continued with gradual deterioration in her condition until October 14th, when she passed 1,100 ml. urine of low specific gravity (1005–1006). The diuresis continued and there was an immediate and dramatic improvement with increased mental acuity, improved vision and lessening of the oedema, and this improvement was maintained. She finally made a complete recovery and was discharged from hospital on November 8th. When seen 3 weeks later her condition was quite satisfactory, her blood-pressure was 120/80, there was no albuminuria and her urea clearance was 79 per cent average normal. The day to day record of fluid intake and output, and clinical and biochemical findings are recorded in the chart (Fig. 4).

The diagnosis in this case was considered to be symmetrical cortical necrosis following toxaemic accidental haemorrhage, although, as in so many reputed recoveries from this condition, the diagnosis rests only on the similarity between these cases and known cases proved at autopsy. Dexter and Weiss (1943) comment that the evidence for the diagnosis in the majority of reported recoveries is very inadequate but although biopsy of the kidneys, to put the question of diagnosis beyond doubt, was not performed in any of their cases, apparently genuine cases of recovery have been reported by Gibberd (1936), Dingle (1943) and more recently by O'Sullivan and Spitzer (1946) who also give a complete bibliography.

The 3 cases here described would, therefore, appear to represent variations in severity of the same clinical and pathological syndrome, the first culminating in combined cortical necrosis and pituitary necrosis, the second presenting the classical features of symmetrical cortical necrosis with, however, clinical evidence that recovery might have occurred and pathological evidence of less renal destruction than is commonly seen, while the third case probably demonstrates a recovery.

SUMMARY.

1. A case of combined anterior pituitary necrosis and symmetrical cortical necrosis of the kidneys following concealed accidental haemorrhage is described.

2. A case of symmetrical cortical necrosis of the kidneys with clinical evidence of a less severe form of the syndrome is described, with confirmatory pathological evidence.

3. A probable recovery from established symmetrical cortical necrosis of the kidneys is reported.

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An Unusual Case of Adherent Placenta Treated in an Unorthodox Manner*

BY

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IN June 1932 Mrs. S. came under my care when 32 to 34 weeks pregnant, with toxaemia which had persisted for many weeks.

Two unsuccessful attempts were made to induce labour by mechanical means; bleeding did not occur. The foetal heart was no longer audible when the second attempt at induction was made 6 weeks after the expected date of delivery. Four weeks later, as labour had still not begun, it was decided to empty the uterus operatively. The cervix was dilated as the first step in a vaginal hysterotomy, and it was then found that the placenta was praevia, so the attempt at vaginal delivery was abandoned. There was very little bleeding. The patient was transferred to the theatre and the abdomen opened. The uterus presented a curious greyish-brown appearance and seemed almost avascular. It was incised as in the classical operation and its wall proved to be only a few millimetres thick. A large amount of odourless liquor escaped and the foetus was extracted. The uterus then collapsed like a bag. There was absolutely no uterine muscle tone, but in spite of this a complete absence of bleeding. There was a central placenta praevia. It was reduced to a thin, mummified, parchment-like structure densely adherent to the uterine wall and no plane of separation could be found. A few fragments of placenta were removed, the cord was cut off short and the uterus was marsupialized by stitching the edges of the uterine incision to the rectus sheath. The uterine cavity was packed with gauze soaked in acriflavine. She had a febrile convalescence. No lochia appeared and no material recognizable as placenta was passed through the abdominal wound or from the vagina. She was discharged from hospital ten weeks later with the superficial part of the abdominal wound not then healed.

Three months later Mrs. S. wrote that she was living a completely normal life. The wound was healed and as she had had 3 quite normal and painless menses she wanted to know what she should do about another pregnancy.

In 1934, that is about 2 years later, she conceived again and had a completely uneventful pregnancy.

She went into labour at the 35th week with the child presenting by the breech and I immediately undertook a Caesarean section again. There was one very thick adhesion from the old scar in the uterus to the abdominal wall. This was not divided and the uterus was incised alongside it. The wall was extremely thin. As soon as it was touched with the knife liquor amnii gushed out. A female child weighing 5 pounds 3 ounces was delivered and cried

* Communicated to the North of England Obstetrical and Gynaecological Society, December 1946.

well. An attempt was then made to trim and repair the uterus but so much bleeding occurred that this was abandoned and the uterus closed as rapidly as possible. On this occasion convalescence was normal except for some trouble with the chest. The patient was discharged on the 24th day with her abdominal wall healed. The child was healthy, was entirely breast fed and 4 ounces above its birth weight.

Mrs. S. was seen again in October 1946. She remains very well. Menstruation is normal and painless. There is no sign of ventral hernia. The pelvic organs are normal and there is surprisingly little fixation of the uterus.

Avoidance of Catheterization following Vaginal Plastic Operations*

BY

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SOME months ago I was discussing with my students the after-care of patients who had been operated upon for prolapse. Miss June Tyson drew my attention to a paragraph in Hamilton Bailey's 1944 edition of "Pye's Surgical Handicraft" reporting the reduction in the catheterization rate in the Mayo clinic from the instillation of one ounce of 0.5 per cent Mercurochrome into the bladder following pelvic operations.

I have found that it is patients who have had a vaginal plastic operation who have the greatest difficulty in establishing spontaneous micturition. The introduction of Carbachol has been of great assistance in all cases other than prolapse cases. I have always disliked the use of an indwelling catheter for these patients as in so many of them it seems to cause additional discomfort whilst repeated catheterization opens the way to infection.

We decided to try the use of 0.5 per cent Mercurochrome in cases of prolapse. This is only a preliminary report, as my house surgeon, Miss Quinn, has really conducted the investigation and will later report fully. For this purpose we record here the results in 63 cases in which Mercurochrome was used and, as a control, the 50 previous cases in which it was not used. Only cases for whom both an anterior and a posterior wall repair were undertaken are included in both series. The same ward sisters were in charge throughout both series except for a few cases in one ward towards the end of the series of treated women.

The figures are as follows:

	Without Mercurochrome	With Mercurochrome
Total cases	50	63
Patients catheterized ...	36	6
Percentage catheterized ...	72.0	9.5
Difference in percentage catheterized		62.5
Standard error of this difference		±9.15

Therefore the difference is 6.83 times its standard error.

The statistical check has been worked out by Mr. W. J. Corlett of the University of Liverpool's Statistical Department and because the difference is so many times its standard error he concludes that it is "a difference with a negligible probability of having arisen by chance".

No explanation has so far been given for the effect produced by Mercurochrome. My suggestion is that it acts as an irritant and that this irritant action has a greater effect upon the nervous control of the bladder than has the inhibitory action of the pain or tissue damage in the area of operation.

In support of this idea of irritant action it should be stated that we have on four occasions (twice during the investigation and twice since) seen the use of Mercurochrome followed by haematuria. All 4 patients settled down on irrigation of the bladder with normal saline without further incident and none of the 4 has had any further bladder disturbance when seen for a "follow-up" visit 3 months after operation.

* Communicated to the North of England Obstetrical and Gynaecological Society, Liverpool, October 1946.

Labour in an Iron Lung

(REPORT OF A CASE)

BY

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THIS case is reported on account of its rarity, and also to put on record the difficulties that were met with in dealing with it.

Mrs. D. D., a primigravida, aged 24, was admitted to the Queen Elizabeth Hospital at 8.30 p.m. on October 12th, 1945, as an emergency.

The last period was on January 4th, 1945, so that she was due to be confined on October 11th, 1945. She had attended her antenatal clinic regularly, and had been normal until 1 week previously when she had noticed that her left leg was giving way. She called in her own doctor and was told to stay in bed. Her legs became progressively weaker. On questioning she admitted that she had a slight cold at that time.

She was sent to the Emergency Hospital, where she had booked to have her baby, on October 8th. The weakness progressed, and by the 10th she was unable to sit upright, collapsing when put on the bedpan. On the 12th her condition deteriorated, and she was transferred to this hospital.

On examination she was deeply cyanosed and her alae nasae were working.

Cardiovascular system. Heart normal; pulse 120. Her blood-pressure was not taken as her condition was too poor to delay.

Respiratory system. Very few breath sounds; intercostal muscles not working.

Abdomen. The uterus was enlarged to the size of a full-time pregnancy. The foetus presented as an extended breech, the presenting part being above the brim. The foetal heart rate was 90.

Central nervous system. Only a very rapid examination was made owing to the patient's poor general condition. Knee jerks and plantar reflexes were absent. Power appeared to be absent in the left arm, almost absent in the legs and only diminished in the right arm. The erector spinae muscles were not acting. There was no complaint of pain, but by this time the mental condition was becoming confused; the woman by then was unable to co-operate, and was rambling in her speech. A tentative diagnosis of either peripheral neuritis or infantile paralysis was made.

Progress. As the patient's condition was visibly deteriorating she was put into an iron lung (Nuffield pattern). After about 20 minutes her colour changed to pink. She remained confused for another 1½ hours, after which her mental condition began to improve considerably. She was unable to swallow although she could speak clearly.

After another hour she complained of abdominal pain and in due course labour was definitely established. The pulse was then 156, foetal heart 120, and the patient exceedingly frightened.

It was thought unlikely that she would survive, but she was so distressed that it was decided to deliver the living and apparently normal baby by Caesarean section at once.

Operation, October 13th, 2.30 a.m. Premedication. Atropine g. 1/100. Anaesthesia was induced with the patient still in the iron lung by means of cyclopropane and oxygen given in a Mushin closed circuit apparatus. An intratracheal tube was passed. She was then removed from the iron lung and a classical Caesarean section was rapidly performed. The usual dressing of gauze and wool covered by elastoplast was applied, and a self-retaining catheter inserted. A lumbar puncture was performed while she was under the anaesthetic. The anaesthetic had been continued with cyclopropane and oxygen, controlled-respiration technique being used during the whole of the time that the patient was out of the iron lung. The patient was returned to the iron lung and allowed to recover consciousness.

The baby was a normal, healthy male infant who has progressed in a completely satisfactory way.

Progress. (*a*) *The obstetric aspect.* The patient was completely conscious by 4.30 a.m. and her general condition was fair. She was complaining of pain over the wound, and the lax abdomen was seen to be moving up and down with the pressure changes in the iron lung, so a tight binder was applied. The general condition improved throughout the day, she took fluids well and secreted normal urine; pulse rate 108.

On the following morning, October 14th, she began to vomit slowly and continuously, and her pulse rose to 160. The abdomen was distended and tender. The stomach was aspirated, 12½ ounces of fluid being withdrawn, with a lot of wind. A flatus tube was passed without result. The abdomen, although distended, became soft and the pain was relieved. The patient complained constantly of thirst, and could not be quietened with sedatives. The thirst was so distressing that it was decided to attempt to put up an intravenous saline drip. A canula was inserted into the internal saphenous vein, and normal saline given as a continuous drip. The condition again improved, the thirst was quenched, the pulse came down to 128 and she passed urine. Drinks were recommenced that evening, but a 5 per cent glucose drip was continued for 48 hours. There was no further vomiting.

Oestradiol benzoate, 50,000 units was given to suppress lactation.

The bowels remained confined until a spontaneous evacuation on the 7th day. A soap enema was given on the 8th day. There was some difficulty in dealing with the constipation, but regular actions were established by the 12th day.

The wound healed satisfactorily, the stitches were removed on the 10th day. There was no pyrexia; the lochia was rather scanty throughout.

Nursing difficulties were great as the woman had to be drawn out of the lung for any attention. She was unable to breathe much by herself although encouraged to do so as much as possible, someone standing by to give artificial respiration when she gave up. At first she could stand being out for only 3 to 5 minutes at a time, becoming cyanosed and terrified quickly, so that nursing attention was confined to releasing the catheter and attending to pressure points twice daily.

On the 3rd day she was able to stay out for 20 minutes on end, on the 8th day 1½ hours, and on the 12th day for 10 hours.

(*b*) *The medical aspect.* The lumbar puncture performed at operation gave the following results. Pressure normal, with normal dynamics and Queckenstedt.

Biochemistry. The fluid contained a white coagulum. It was centifruged and the clear and colourless supernatant fluid used for analysis. Protein content: 86 mg./100 ml. Sugar content: 75 mg./100 ml. NaCl. content: 775 mg./100 ml. Globulin: Pandy, plus. Nonne-Apelt, trace. Urea content: 68 mg./100 ml. Lange: 0011000000.

Wassermann reaction. Negative.

The patient was examined by the honorary physician on October 18th. *Legs.* Quite good movements at ankles and toes, rather weak at hip and knees. Knee jerks practically absent; plantar reflexes, both flexor; sensation to pinprick normal.

Abdomen. Upper intercostal muscles being employed; diaphragm apparently not working; sensation to pinprick normal where tested.

Arms. Power: very weak and more so on the left. Left flexion and extension very weak at elbow. Right: flexion fair at elbow; extension, weak. Left shoulder: Abduction absent. Right shoulder: Abduction very weak. Left shoulder: Adduction poor. Right shoulder: Adduction about the same. Reflexes: Biceps—right, plus; left, absent. Supinator—right, plus; left, absent. Triceps—both absent.

Sensation to pinprick: Apparently some numbness at ends of fingers.

Cranial nerves. Face, no asymmetry; eye movements normal.

Diagnosis. Anterior poliomyelitis.

Subsequently the patient had some progression of the weakness of her legs particularly affecting dorsiflexion of the right foot. She remained in the iron lung until November 21st, 1945, when she was removed and showed poor respiratory movements, mainly diaphragmatic, with no power in her abdominal muscles. She complained of tightness of the chest and showed a slight degree of impairment to percussion at the right base. Penicillin and sulphonamide were commenced and penicillin was continued until December 20th.

Subsequently she had periods of improvement in her ability to breathe, with periods of deterioration. She was in and out of the iron lung several times and had another course of penicillin for her chest condition. At about the middle of January 1946 she began to develop signs of consolidation of the left base, which were shown on X-ray, and, on the whole, she deteriorated.

She was returned to the iron lung on January 23rd, and had a course of sulphonamides, which reduced her temperature, and gradually she again improved until she was having increasing periods out of the respirator, with a maximum of 4 hours.

During the time she was in hospital she had massage and breathing exercises when her general condition was suitable. The condition of the lesion of the central nervous system became static and she had great weakness of all limb muscles, as well as the muscles of respiration.

She was discharged to the hospital of St. Cross, Rugby, on February 27th, 1946. The following report was received from Rugby on November 21st, 1946: "The patient has recently been discharged from hospital and is now ambulant, wearing a posterior spinal support. The abdominal and spinal muscles are still very poor, and are not likely to make much further recovery. She is, however, able to walk about and do a certain amount of her own housework."

The following points are interesting from the obstetric point of view.

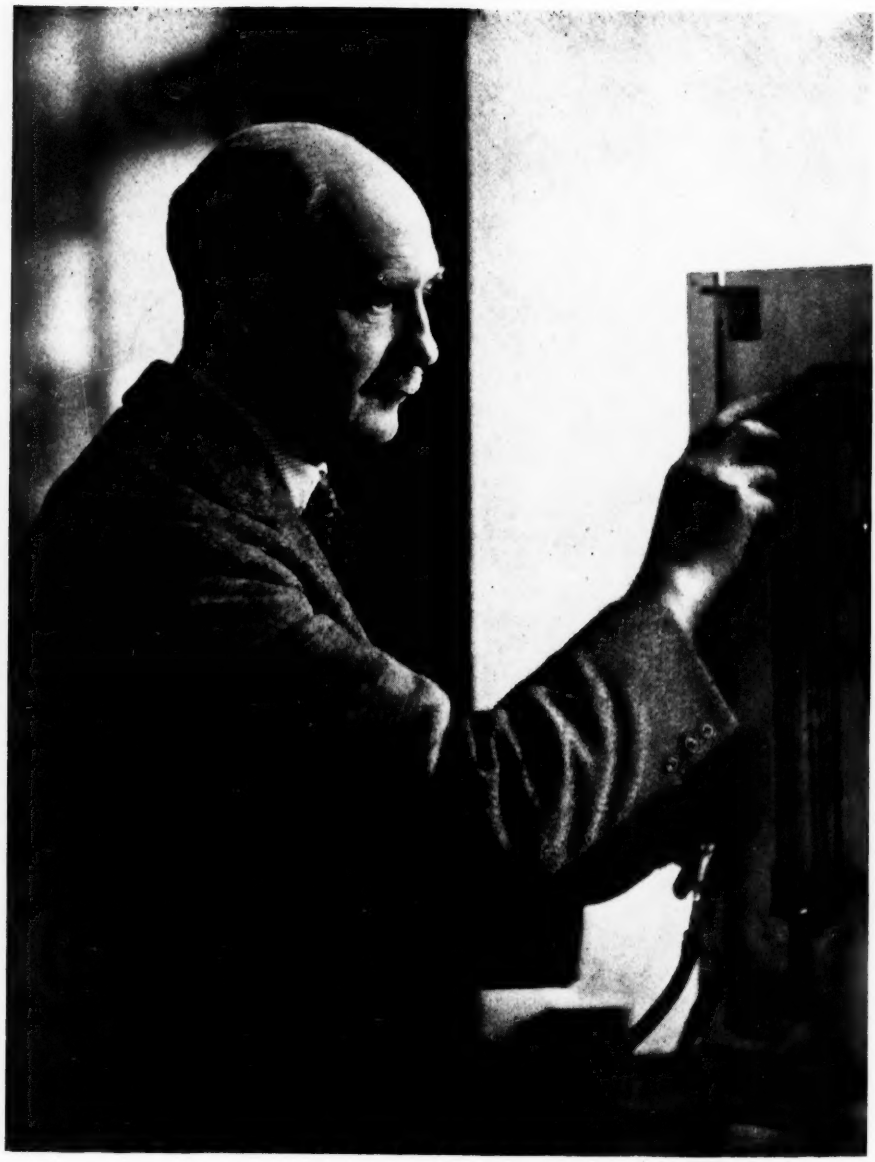
(1) The onset of labour. This commenced quite soon after the patient was put into the iron lung. May not the rhythmical pressure changes have helped to stimulate the uterus at term, resulting in the onset of labour?

(2) The method of delivery. Once in labour it was necessary to deliver the patient. The alternatives were Caesarean section, or to allow the cervix to become fully dilated and then deliver vaginally under anaesthetic, the patient being removed from the iron lung when anaesthetized. The former method was chosen in view of the possible effects of labour on a patient in such poor general condition, the distress the patient already felt in being placed in the lung, and the unengaged breech presentation in a primigravida.

(3) The vomiting may have been encouraged by the negative pressure produced in the lung. The intravenous drip ran well in spite of this. The lung was kept working at a rate of 2 respirations per second, the pressure changes varying from +18 to −18 ml. water.

(4) The absence of any other postoperative complications in a patient nursed flat on her back without any attention being given to her bowels for a week.

My thanks are due to Mr. Barnie Adshead, the honorary obstetrician, Professor Cloake, the consultant physician and Miss Green, the anaesthetist, for permission to publish this case, and for their kind and helpful co-operation.



SIR JOSEPH BARCROFT

Obituary

SIR JOSEPH BARCROFT

C.B.E., M.A. (Camb.), D.Sc., Hon. M.D., Hon. F.R.C.O.G., F.R.S.

SIR JOSEPH BARCROFT died suddenly at Cambridge on March 21st. He was 74 years of age. His life had been devoted to research in problems of physiology, nutrition and veterinary science. Though he was not a medical man much of his experimental work was done on human subjects and the results of his investigations have had far-reaching effects on the practice of medicine.

Joseph Barcroft was born on July 26th, 1872, the son of Henry Barcroft, D.L., of Newry, Co. Down. He was educated first at Bootham, the Friends' School, at York, and later at the Leys School, Cambridge. He entered Kings College, Cambridge, where he became a prizeman and exhibitioner in 1894. He took a first in both parts of the Natural Science Tripos and graduated in 1896. In 1900 he was elected to a fellowship in his own college and in 1910 became a Fellow of the Royal Society. Under J. N. Langley he held the University readership for a few years until in 1925 he succeeded to Langley's chair. This he held for twelve years. Unwilling to retire, he continued his investigations and turned at this time to a study of pre-natal physiology. In 1941, when he was nearly 70 years old, he accepted the directorship of the unit of animal physiology for the Agricultural Research Council. He held this post until his death. In these latter years he attacked problems in animal biology with the same enthusiasm as he had used in human physiology and with equally important results.

The work which will be associated with his name above all his other accomplishments is that relating to respiration. His work on the oxygen carriage of the blood is classical. Against strong opposition he maintained his theory that the passage of oxygen through the alveolar epithelium is a simple physical process. When experimental proof was necessary he did not hesitate to expose himself for several days to reduced oxygen pressure in a glass box in his laboratory. The question of altitude effects led him to organize an expedition to the Andes to study the condition at first hand.

His later work included a study of the function of the spleen, in respect to blood storage. From this he became interested in blood volume, which carried him on to the study of foetal circulation. He investigated the oxygen supply to the foetus in utero. Most of his work was done on foetal sheep. He showed that in these animals there is a relation between maternal nutrition and foetal development. Observations on human embryos were included in this work.

During the two World Wars he served in an advisory capacity to the War Office as a member of the Army Medical Directorate. He experimented with poison gas to deter-

mine its suitability for chemical warfare and in many other ways served the Allies.

He was knighted in 1935. Honorary degrees from universities at home and abroad were heaped upon him. In 1943 he received the Copley Medal—highest award of the Royal Society. In 1944, in recognition of his outstanding contributions to prenatal physiology, the Royal College of Obstetricians and Gynaecologists elected him to its Honorary Fellowship. Until his death he was Chairman of the Nutrition Committee of the College.

He was simple, kind and sincere. Through his encouragement of the work of younger men he influenced contemporary physiology the world over. His students represented many countries. He wrote simply and spoke convincingly. His work showed characteristic enthusiasm to the end. He died while returning home from his laboratory.

ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS

A Meeting of the Council was held in the College House on Saturday, January 25th, 1947, with the President, Mr. William Gilliatt, in the Chair.

The following were admitted *in absentia* to Membership of the College:

Ian Brandon Ewart.
Goeffrey Jasper St. Clair Fisher.

The following candidates were elected to the Membership of the College:

Duncan Ballantine.
Margaret Rosalind Biggs.
William Stewart Campbell.
Henry Vincent Corbett.
John Barr Cochrane.
Sidney Joel Cohen.
George Laurence Daly.
Albert Davis.
John Roscoe Dickinson.
Bessie Dodd.
Morag Dods.
Ian Donald.
Robert Chalmers Gill.
Jean Lilian Hallum.
Arthur Jack Hardy.
Ronald Fox Lawrence.
Thomas Henry Lawton.
John Malcolm McBride.
Reginald Arthur Edward Magee.
Eileen Cathcart Miller.
James Duncan Murdoch.
Michael Kieran O'Driscoll.
Stewart Sandeman Favell Pooley.
Louis James Quinn.
Kathleen Mary FitzGerald Worrall.
James Lawrence Wright.

REPORTS OF SOCIETIES

ROYAL SOCIETY OF MEDICINE

Section of Obstetrics and Gynaecology
November 15th, 1946.

A discussion of "Stress Incontinence of Urine," held by the above section, was opened by Mr. Everard Williams, who reviewed at length the origin of this distressing symptom and the various methods of surgical treatment that had been tried in the past for its relief. He pointed out the necessity in any procedure for the elevating of the urethra at a point just as it left the bladder and described briefly the operation that he had practised with considerable success. This consisted in approaching the neck of the bladder from above and by suture approximating it to the fascia adjacent to the posterior surfaces of the pubic bones. Mr. Everard Williams was followed by Mr. Terence Millin. "Cases of stress incontinence," he said, "should be divided into four groups: Those with a congenital sphincteric weakness, post-puerperal cases which will frequently go on to spontaneous recovery or may be benefited by faradic stimulation, menopausal which may respond to hormone therapy, and lastly the commonly met with stress incontinence coming on some years after childbirth."

Cysto-urethroscopic investigation always revealed a patulous bladder neck, and at first he had always practised an intravesical operation whereby a wedge of tissue was excised from the posterior lip of the neck of the bladder. This was sometimes combined with the provision of a Goebell sling of ribbon catgut and such was the success that finally a decision was reached to discard the intravesical part of the operation entirely and to fix the neck of the bladder to the tendons of the recti close to the pubes, in an attempt to draw up and fix the ptotic structure.

Convinced that the essential requirement for cure was elevation of the bladder neck, he devised a "muscle hammock" or "sling" operation. The details of this operation are to be found in the published original paper. The underlying principle is the same as that used by Aldridge and others, in that the neck of the bladder is elevated by a fascial sling, originating at each end from muscle of the abdominal wall. In Millin's operation the whole rearrangement was effected through a single transverse incision of the skin and the fascial strips were cut transversely from the fascia in front of the abdominal wall muscles. He claimed good results, and many present hoped his good figures were more accurate in their estimation of success than were those he offered in his assessment of the cure rate (50 to 80 per cent) for stress incontinence by a simple anterior colporrhaphy. This figure was certainly too low in the opinion of subsequent speakers. Mr. Millin advised that whenever a vaginal wall prolapse was apparent the vaginal operation should first be tried, as when such a repair has failed to cure the incontinence he believed a sling procedure should be employed. He cited the results of 67 operations, with only one failure. Various details in after treatment were discussed.

Professor Chassar Moir followed and forthwith proceeded to challenge Mr. Millin in his statement that 40 per cent of cases of stress incontinence of urine are not cured by a simple operation from below. He said that in his opinion the Aldridge modification of the Goebell-Stoeckel operation deserved more attention than the mere mention that it had received so far. His introduction to this work was in 1929, when he saw Werner of Vienna perform the operation. Two narrow ribbons of fascia were dissected down from the anterior abdominal wall and left attached to the pyramidalis muscles. With the patient in the lithotomy position, exposure of the urethra and bladder neck was then made as in the orthodox colporrhaphy operation, and a tunnel opened up into the space of Retzius on both sides. The fascial bands were now pulled down by means of long forceps and were united under the neck of

the bladder. In 1942 Aldridge described a modified technique in which strips of fascia were dissected from the abdominal wall, above, and parallel to, the inguinal ligaments. These strips were left attached to the recti muscles about 1 inch above the pubes and brought down under the urethra as described above. A second modification was made by Studdiford, who first completed the vaginal dissection before the performance of the abdominal part of the operation. As in Millin's operation, the fascial strips were passed under the already mobilized urethra, brought up the tunnel in the fascia of the opposite side and sutured to the fascia of the opposite rectus muscle.

On the whole Professor Chassar Moir preferred the Aldridge technique. He did not approve of the wide opening up of the space of Retzius which was necessary in both the Studdiford and Millin operations. In the latter also there was a distinct risk of penetrating the vaginal wall or damaging the urethra or neck of the bladder.

Following the operation he advised catheter drainage for 10 days, during which time the patient is given sulphanilamide 0.5 g. 4 hourly.

A meeting of the Section of Obstetrics was held at the Royal Society of Medicine, on Friday, January 17th. The subject under discussion was the management of the normal third stage of labour and the haemorrhage occurring during this stage. The opening speaker, Mr. J. D. S. Flew, postulated that, whereas attention had been given in recent years to the management of the antenatal period and to the first and second stages of labour, little change had taken place in the conduct of the third stage. He was not so much concerned as to how the obstetrician conducted this stage or how he dealt with cases of excessive haemorrhage, but rather with what was taught to medical students, and in particular to pupil midwives, who, when qualified, conducted 60 per cent of the midwifery in the country.

It was well known that a badly conducted third stage of labour could cause post-partum haemorrhage. Such bad conduct consisted usually of feeble attempts to express the placenta by massaging the uterus and pushing it downwards. If haemorrhage occurred Crede's expression was attempted, but usually failed. No other advice was given the midwife except that she should remove the placenta manually, and Mr. Flew doubted whether midwives could do this on their own. It would obviously be extremely dangerous in an already exsanguinated patient. The use of any oxytoxic drug was forbidden on account of the danger of the formation of a constriction ring. In 1935, in the Obstetric Unit of the University College Hospital, 0.5 mg. ergometrine was given intramuscularly to 500 consecutive normal cases as soon as the head was delivered. In no case was there any evidence of constriction ring, and in no case was a manual removal of the placenta necessary. He quoted Peel to the effect that a similar investigation had been carried out at King's College Hospital, using 5 units of pituitary extract. In these series constriction ring occurred twice. Mr. Flew did not suggest that the routine use of ergometrine during the third stage of labour should be taught. He had no hesitation, however, in advising that this drug should be given intravenously or intramuscularly in cases of haemorrhage during the third stage. Especially important, in his opinion, was it that much teaching should be thus revised when haemorrhage occurred in domiciliary midwifery, whether the case was conducted by doctor or midwife. The drug would control the bleeding, and the patient could be removed safely to a hospital where her general condition would be restored and the placenta removed manually under good conditions.

Mr. Gibberd believed that in the management of haemorrhage in the third stage of labour, in the practice of the midwife acting alone, routine treatment should not exceed 2 attempts at expression of the placenta. No one seriously expected a midwife to embark upon the operation of manual removal of the placenta, and there was every reason to believe that such heroic treatment, if adopted, was more likely to kill the patient than to save her life. It was therefore important to cease advocating such treatment, and more emphasis should be placed upon general measures for combating collapse that could be applied while proper assistance was awaited. Crede's method of expression failed because of a mechanical difficulty in securing a satisfactory grip of the uterus, or because of constriction ring, and he did not believe any other local treatment should be

attempted until an anaesthetist was available and adequate preparation had been made for manual exploration of the uterus. There was only one cause of mechanical difficulty in manual removal of the placenta, other than true placenta accreta, which condition he personally had not seen, and that was the constriction ring. He did not believe in the condition of the " morbid adhesion " of part of the placenta nor could he support Mr. Flew in his proposition to advise the use of ergometrine in the third stage of labour.

Professor Lloyd in the main supported Mr. Gibberd. She emphasized that a distended bladder was one of the most common causes of delay in the third stage and, for the treatment of haemorrhage during the third stage, spoke in support of the " Flying Squad Service ", and the good work it was doing in Birmingham. A great majority of cases to which it was called were cases of this nature. This team of workers was always available, and on arrival at the patient's house concentrated at once on the restoration of the patient's general condition. Manual removal could usually be performed under satisfactory conditions, and ergometrine was not given before the placenta was delivered.

The last opener was Dr. P. Denham, who had just completed 3 years as Assistant Master of the Rotunda Hospital. He emphasized that at that hospital they saw no reason whatever to consider change of policy that has been in existance for some years in the management of the third stage of labour. That policy involves a careful watching of the patient's condition, and the absolute refusal to allow the attendant nurse or student to touch or otherwise examine the uterus, in the absence of any untoward symptom or sign. When the umbilical cord lengthened and a small gush of blood indicated the separation and expulsion of of the placenta into the vagina, the Labour Ward Sister was allowed to feel the fundus, and to note the other signs of separation and expulsion. The catheter was then passed, and by gentle and intermittent pressure, the placenta and membranes were expelled intact from the vagina. If haemorrhage was noted without the signs of placental separation, a catheter was passed, the fundus massaged, and an effort was made to express the placenta by Crede's method. If this failed, the patient was anaesthetized and removal was attempted once more. Oxytoxic drugs were not given before the end of the third stage of labour. The results achieved can be tabulated as follows: out of over 7,000 deliveries manual removal of the placenta was necessary in under 1 per cent of the cases. Inversion of the uterus had not been seen in the Rotunda Hospital for at least 20 years.

Following the four opening speakers, many present at this very large meeting spoke. The points which attracted most attention were (i) that raised by Mr. Flew in advocating a revision of the management of haemorrhage in the third stage of labour, especially when it occurred in domiciliary midwifery, and (ii) the insistence from the Rotunda Hospital on the drastic revision of the teaching of the management of the normal third stage of labour in this country. On the first point, it appeared that the majority of speakers felt in the words of Professor Chassar Moir, that it was preferable to have a live patient with a retained placenta and constriction ring than a dead patient whose placenta had been removed.

March 21st, 1947.

Anaesthesia for Caesarean section.

Dr. Rufus Thomas (Croydon), said that he had used spinal analgesia induced with heavy nupercaine (Ciba) for almost all his Caesarean sections during the past 9 years.

The main objections to the use of spinal analgesia were briefly reviewed. One was that pregnant women near term were highly susceptible to cocaine products. Thomas pointed out that nupercaine, as a quinoline derivative, was not related to the cocaine group so this objection did not apply.

Another objection was that collapse and sudden death were liable to occur from sudden drop in blood-pressure, due to vasoconstrictor paralysis. This is avoidable, he maintained, by the following precautions: ephedrine should be given before operation; the position of the patient after injection of the spinal analgesic should be carefully adjusted so that the solution did not rise above the level of the eighth dorsal (which gave anaes-

thesia nearly up to the ensiform cartilage): by recording the blood-pressure throughout the operation and, if the systolic pressure fell to 90 mm. Hg., by injecting methydrine 15 mg. into the uterine muscle. This restores the blood-pressure up to or above normal very rapidly, by peripheral vasoconstriction. The other precaution was to avoid spinal analgesia in patients who had low blood-pressure or severe anaemia until their condition had been restored by blood transfusion and other means. Placenta praevia was the most common condition in this category. Thomas included in his numbers 58 cases of placenta praevia operated upon under heavy nupercaine spinal analgesia.

Cases of meningitis, some fatal, have been reported. This must be guarded against by the strictest precautions in the aseptic technique of preparation of needles, ampoules, syringes, hands of the anaesthetist and the back of the patient.

Headache was an objectionable postoperative complication, but could be minimized by using the finest spinal needle, keeping the patient flat for 24 hours after section and raising her to the semi-Fowler position very gradually. Headache is thought to be due to leakage of cerebrospinal fluid.

The advantages of spinal analgesia were stated to be:—

Injection is easy, the patient feeling nothing after the first prick of the needle.

The mother is fully conscious, hears her baby cry at birth and takes a lively interest in its condition and sex. She can be given drinks during and after operation, and can see her husband immediately.

The baby is completely unaffected by the anaesthetic. This is a great advantage in cases of foetal distress. Many infants cry before they have been completely extracted from the uterus.

The surgeon has the maximum of operative comfort. Relaxation is perfect, access to the lower segment being greatly facilitated. Uterine tone is good and bleeding minimal. Many operations are practically bloodless. The placenta often delivers itself.

The postoperative period is, apart from possible headache, very comfortable. Vomiting and distension are rare, and chest complications practically non-existent.

Thomas gave the following figures:—

No. of sections	No. of infants	Infant losses	Infant salvage, per cent
346	350	12	96.5

There was no maternal mortality, either under or due to the spinal analgesic.

Disproportion was the chief indication for operation; 58 cases of placenta praevia were operated upon.

Forty-one cases were operated upon twice, and 5 thrice, under spinal analgesia.

Thomas is of the opinion that spinal analgesia is safe for cases requiring Caesarean section, provided that proper precautions are taken. Women with cardiac decompensation are unsuitable.

Mr. Peel (London): My contribution to the discussion is a small series of cases of Caesarean section performed under caudal anaesthesia.

Fifty entirely successful operations have been done at King's College Hospital, with no maternal mortality, and no abnormal morbidity. No serious complications occurred attributable to the anaesthetic agent. All the babies were born alive. Three died during the neonatal period for reasons quite unconnected with mode of delivery or anaesthetic agent.

The advantages of regional block, achieved by either spinal or caudal anaesthesia, are that narcosis and anoxia of the foetus, invariable to a greater or lesser degree with all forms of inhalation anaesthesia including nitrous oxide and with intravenous anaesthesia are avoided. Caudal anaesthesia obviates the inherent dangers of spinal anaesthesia, to which the pregnant woman, in the experience of the majority, is particularly susceptible.

Technique consists of the injection into the sacral hiatus of 50 to 100 ml. of metycaine (1½ per cent) in divided doses—10 ml to 30 ml. and subsequently 10 ml. to 20 ml. depending upon the rapidity and extent of the development of anaesthesia. It takes 20 to 40 minutes from the initial injection before full anaesthesia is established. Slow injection of the fluid is necessary to prevent nausea, vomiting and drop in blood-pressure. Premedication is best avoided from the point of view of the baby, and no premedication is better than partial and inadequate premedication from the mother's standpoint. Patients with low blood-

pressure and recent haemorrhage are unsuitable, but otherwise the field of choice is wide and varied. It is particularly suitable for Caesarean section in the diabetic patient operated on before full term. Haemorrhage is minimal and makes the operation safer for mother and child. Postoperative complications are minimal. The method is limited by difficulties in technique. Failure is always due to inability on the part of the anaesthetist to insert the needle into the sacral canal, due to anatomical abnormalities (10 per cent), obscuring of the bony landmarks by adipose tissue or oedema, and inexperience of the administrator.

Mr. Mackintosh Marshall (Liverpool) recalled that he had written something on this subject in 1939. There were still the 3 main anaesthetic groups —inhalation, spinal and local—though to these must now be added intravenous methods with or without the addition of curare. Though he had greatly increased his experience in all these methods there was nothing he would like to retract while there was much that he would heavily underline. Some people were already maintaining that pentothal-curare-cyclopropane was the answer to this problem. In one obstetric unit for which he was responsible this combination was being used, so that he might eventually learn its good and bad points. In the meantime it must be acknowledged that these three were highly potent drugs and, now that curare was available to all, he experienced a certain degree of apprehension for the future. In this regard a dictum of Beecher's (*J.A.M.A.*, **111**, 122. 1938) should be borne in mind: "Whenever an anaesthetic agent has enough good qualities to get it past an early trial period, it seems to take about ten years to evaluate its bad effects."

There were reasons why most of the inhalation methods were unsatisfactory and even dangerous: (1) A minimal amount of pre-operative sedation often contributed to accidents during induction, such as vomiting, laryngeal spasm, etc. Aspiration pneumonia was not extremely rare and there were fatalities. If a state of anoxia arose in the mother it was transmitted to the child with extreme rapidity and atelectasis or even a stillbirth or neonatal death could result. (2) The action of inhalation anaesthetics on uterine tone was often unfavourable but could usually be counteracted by timely and adequate administration of oxytocic drugs. (3) If for any reason the delivery of the child was unduly delayed, the foetus became anaesthetized and resuscitation might be difficult. If to this were added the shock of a difficult extraction, the child might succumb. Admittedly in the perfectly sound woman, operated on before the onset of labour, the above dangers, while real, were not likely to occur often with the expert anaesthetist.

But when labour had been prolonged, when poor uterine action had been a prominent feature, when large amounts of sedatives had been used, when the membranes had been ruptured many hours, if the foetus were premature, if moulding were extreme or a large caput were present or there were frank signs of foetal distress then one or other of these dangers was much enhanced, and he believed general anaesthesia was absolutely contra-indicated. The delayed emptying time of the stomach in labour had always to be remembered, and the nourishing draught of soup at noon was often returned into the anaesthetic mask in the evening.

The choice then lay between spinal and local anaesthesia. About spinal anaesthesia he would only say that it was practically ideal except in one respect —collapse or even death seemed to occur more often in Caesarean section than in any other abdominal operation for which it was used. Obstetricians were divided into 3 groups on this question; one had experienced fatalities and condemned spinal anaesthesia; another had neither experienced fatalities nor believed that they did or ever need occur; while a third, among whom was the speaker, firmly believed in this special risk and, further, that it was not always preventable. He still used spinal anaesthesia in a number of patients, always when he did an extraperitoneal section, in patients in whom special technical difficulties could be foreseen and, finally, in large or obese women whom he had found supported spinal anaesthesia extremely well. He had never seen spinal anaesthesia have the slightest adverse effect on the foetus.

However, he was still unable to deny the evidence of his eyes—local anaesthesia was safest for the transperitoneal lower segment operation. All the regrettable incidents which he had encountered during a long experience were associated either with inhalation or, but to a much lesser degree, with spinal anaesthesia. At least 6 out of 10 patients would support this method very well indeed. The remaining 3 or 4 demanded something

more, and with these it was the speaker's practice to open the abdomen under infiltration alone and to complete the delivery and operation quickly under a small dose of pentothal. It was, nevertheless, unlikely that many obstetricians would extend this form of anaesthesia to the majority of their patients. Yet there were certain conditions and circumstances in which safety of mother and child could be properly preserved only by the use of local anaesthesia, these were heart disease, diabetes, pre-eclampsia, most cases of antepartum bleeding, the premature child, and the case of the " very important baby ". Pre-operative sedatives should not be given. Local anaesthesia is of as much importance to the child as it is to the mother. It promises the best oxygen supply in the mother's blood so long as the baby is dependent on the placental circulation. It was often forgotten that the expectant mother was on the whole a most reasonable person. With simple and honest explanations her confidence could be won and she would no longer insist that delivery, whether vaginal or abdominal, should be entirely free from pain or discomfort.

Dr. Lloyd-Williams (London) gave a brief résumé of the methods used in the Obstetric Department of the Royal Free Hospital since 1928. She stressed the importance of complete confidence and co-operation between surgeon and anaesthetist. After a considerable trial of spinal analgesia, the method being used for some times as a routine in the Department, she does not advocate its use for the normal case. With the introduction of intravenous anaesthetics, and the light plane of anaesthesia usually required, she does not consider it justifiable to use a method which may involve apprehension and mental strain on the part of the patient.

Dr. Massey Dawkins (London): Epidural analgesia for Caesarean section possesses all the advantages of spinal analgesia without any of its disadvantages. There is no danger of meningitis or nerve lesions, fall of blood pressure is much less and there is no headache. Patients are able to assume Fowler's position immediately on return to the ward and there is prolonged freedom from post-operative pain, in some cases for as much as 24 hours. The nursing staff much prefer it to any other form of anaesthesia. Pethidine 100 mg. is given 1¼ hours before operation and this is repeated ¾ hour before. If there is any suspicion of foetal distress, this is omitted. Nupercaine 45 ml. of 1/600 solution is injected into the epidural space between the 1st and 2nd lumbar vertibrae, the patient is placed in 10° Trendelenberg position for 25 minutes and then the operation is commenced. Owing to the occasional failure of the anaesthetic to affect the touch sensation, some patients may require gas and oxygen, but if the difference between touch and pain is explained to the patient this is rarely necessary. In a short series of cases carried out in the Obstetric Department of the University College Hospital the results were uniformly satisfactory and there were no complications of any sort.

Dr. J. N. Cave (London): There was always some difficulty in pursuing a line of inquiry satisfactorily owing to the prejudices of surgeons, but, so far, results obtained seemed to show the following advantages and disadvantages of using a spinal anaesthetic for Caesarean section, especially the lower segment operation.

From the foetal point of view—the foetus unaffected by any drugs cries readily as soon as born, whilst in a large percentage of operations under inhalation anaesthesia there is difficulty with the infant for some time.

From the surgeon's point of view—he can proceed at his own pace, there being no need to hurry; the uterus contracts well and postpartum haemorrhage does not seem to occur, whereas after an inhalation anaesthetic sometimes the uterus is inclined to go slack. The main disadvantage is that this contractibility of the uterus sometimes makes the delivery of a large head somewhat difficult.

NORTH OF ENGLAND OBSTETRICAL AND GYNAECOLOGICAL SOCIETY.

A meeting of the Society was held in Manchester on January 3rd, 1947.

Dr. W. Calvert described a case of Rh isoimmunization treated by hysterotomy and sterilization, and asked the Society if it approved the course adopted.

Mrs. L., aged 41, had a child in 1927 which was alive and well. In 1929 she had a stillbirth at term; details of the foetus were not available. In 1931, 1934 and 1936 there were stillbirths between 6½ and 8 months, and all showed hydrops foetalis. In 1941 a pregnancy had been terminated at 3 months because of the previous history and without investigation.

The speaker first saw the patient in January 1946, when she was 3 months pregnant. Specimens of blood from Mr. and Mrs. L. were sent to Dr. F. Stratton, who reported that Mrs. L. was Rh negative and that there was a very high antibody titre in her serum. The father was homozygous Rh positive. His children, therefore, would be all Rh positive and would suffer from haemolytic disease, which would be severe because of the high concentration of antibodies. In view of this, hysterotomy and sterilization were carried out in February 1946, removing two foetuses.

Dr. Stratton reported on the foetuses:

" (i) Length 74 mm. Rh positive.
(ii) Length 78 mm. Rh positive.

" It therefore appears that these children would have been affected as suggested. The mother is Rh negative and has antibodies in her serum . . . I might add that the cells of these early foetuses show strong sensitivity.'

Dr. Calvert summarized that if a mother has had hydroptic infants and the father is homozygous there will be no more living children of that marriage. In putting the case before the Society, he wished not only to draw attention to this implication of recent knowledge, but also to find out if the Society approved the course adopted.

Discussion

Dr. N. L. Edwards spoke on the question of re-marriage, and also told of a case in which a normal baby had been born following a previous pregnancy in which labour had been induced because of this condition, and twins had been born and developed icterus gravis and died. The father was said to be homozygous.

Dr. Rowarth suggested that the pregnancy should have been allowed to go on and the patient to have aborted or not as chance would have it, but if necessary to be sterilized later.

Mr. Snaith thought that the increased incidence of accidental haemorrhage was a point supporting Dr. Calvert's treatment.

Dr. Calvert, replying, thought that if there really was any chance of a normal child being born following such a history, then he would have to agree that sterilization was unjustifiable.

Prof. Daniel Dougal reported a case of torsion of an ovarian cyst associated with genital hypoplasia—bilateral aplasia of the paramesonephric or Müllerian ducts.

Miss K., aged 19 years, sought advice because she had not menstruated. Her vagina was absent, physique good, secondary sex characteristics well developed, but unattractive and dull mentally. She was not contemplating marriage and there was no need to construct an artificial vagina.

In addition to primary amenorrhoea, she complained of right-sided abdominal pain of sudden onset 3 weeks previously, which remained severe for a week, but was now much better though still troublesome.

Abdominal examination was negative. External genitals were normal. The hymen surrounded a shallow depression which represented that part of the vagina developed from the urogenital sinus. A cervix could not be palpated on rectal examination, but an elastic swelling the size of a goose's egg could be felt applied to the right lateral wall of the pelvic cavity. In view of the possibility of retained menses in one half of a double uterus the abdomen was explored.

The ovaries were well developed but longer than normal and their axes were directed downwards towards the corresponding internal abdominal ring, to which they were attached by a short length of ovarian ligament. The uterus was represented by a curved and flattened band of muscular tissue about a quarter of an inch wide lying beneath the peritoneum covering the posterior and lateral aspects of the bladder and terminating on each side at the internal abdominal ring immediately mesial to the ovarian ligament.

The Fallopian tubes were absent except for some fimbriae close to the upper pole of each ovary. Close to the fimbriae on the right side was a small cyst 1¼ inches in diameter, evidently an enlarged hydatid of Morgagni. The cyst was bluish-black in colour from torsion of its pedicle.

The right kidney of normal size lay beneath the

peritoneum covering the lateral wall of the true pelvis. It formed the swelling palpated on rectal examination. The left kidney was normal in size and position.

It seemed that the Müllerian ducts had remained in an extremely rudimentary state and there was no attempt at fusion except at their lower extremities. This may have been either the cause or the result of abnormal action of the gubernaculum, which had dragged its point of attachment to each Müllerian duct, i.e. the future uterine cornu, right down to the corresponding inguinal canal as occurs normally in the male.

Prof. Dougal had seen 2 other cases in which a similar failure of development had occurred unilaterally and the kidney was absent on the affected side.

Dr. C. E. B. Rickards described "Two cases of renal dystopia associated with gynaecological conditions."

Case 1. A housewife, 32 years, healthy-looking, with normal menstrual history. She had one child aged 8 years, the confinement being followed by obstetric paresis. She complained of backache, yellow discharge, and dysmenorrhoea. Examination revealed an unhealthy cervix, an anteverted uterus lying to the right and irregularities in the posterior fornix. Diagnosis was made of endometriosis and chronic cervicitis.

She was admitted to hospital, examined under anaesthesia, and the abdomen opened. The right half of the uterus was normally formed, the left rudimentary. The right Fallopian tube and round ligament were normal. The right ovary contained a follicular cyst the size of a golf ball. On the left a fibrous hypoplastic tube ran into an eminence representing the left side of the uterus. The left ovary and round ligament were well formed. There was a marked degree of endometriosis in the recto-vaginal space. The left kidney lay in front of the sacrum.

Panhysterectomy with right salpingo-oöphorectomy was done. The left ovary and rudimentary Fallopian tube were not removed. Recovery was uneventful.

Radiological examination showed a right kidney with slight dilatation of the pelvis in normal position. The left kidney was overlying the right sacro iliac joint. Tests of renal function did not show abnormality.

Case 2. An unmarried woman, aged 36 years, who complained of heavy periods every 3 weeks for the past 3 months and dragging pain in the right side during menstruation for 6 months.

Examination revealed a fibroid in the uterus and a haemoglobin of 54 per cent.

Laparotomy revealed the uterine fibroid and a retroperitoneal mass anterior to the sacrum. The renal pouches were empty.

Panhysterectomy was performed.

Subsequent radiological examination showed the left kidney pelvis lying over on left wing of the sacrum, and the right lying in the hollow of the sacrum.

Dr. Rickards commented that according to Young any kidney out of its normal position may be referred to as dystopic. An ectopic kidney implies that the condition is congenital. According to Fowler, three types are recognized, the commonest being unilateral ectopy, the next being crossed ectopy, and the rarest being bilateral ectopy. According to Eisendrath, only 33 cases of bilateral ectopy had been reported up to 1937. The congenitally displaced kidney usually has a short ureter, has little or no fatty covering, and derives its blood supply from many vessels arising from the aorta and iliac arteries. Most of these cases are asymptomatic and operative treatment is not called for.

Mr. G. McIntosh Marshall read a paper on "Fascial Slings—the direct suprapubic route".

Mr. Marshall stated that the anatomy is constant but the technique can vary in many details. Obesity does not render the operation more difficult, but previous lower abdominal incisions may cause a little embarrassment.

This operation seems to be better than the Aldridge operation in 4 ways: 1. The route is entirely abdominal, there is therefore less risk of sepsis. 2. The duration of the operation is less. 3. The sling supports a higher portion of the urethra—the urethrovesical junction. 4. The sling has its origin in an active muscle slip. On the other hand, this operation is not associated with repair of the anterior vaginal wall; but the clinical state of the majority of patients selected does not show

need for this. Mr. Marshall doubts whether the usual vaginal procedures possess very enduring features, the tissues are so tenuous and indeterminate.

The musculofascial sling works by elevating and angulating the urethra and, indirectly, the urethrovaginal septum and the anterior vaginal wall; it compresses the urethra and this effect is increased by the expiratory movements of the abdominal wall whether of normal respiration or more violent coughing or sneezing. All these actions are demonstrable during the operation. How long the fascial sling persists as a tendon moving in response to its muscle is not yet known, but so long as the static effect of the sling persists the result will be satisfactory.

In selecting patients Mr. Marshall had not limited his choice to those in whom other plastic methods had failed; he had used it as a primary procedure in a few cases complaining of partial or complete incontinence where there had been little or no evidence of prolapse. The immediate results had been most gratifying.

With epidiascope and cinematograph Mr. Marshall demonstrated the musculofascial slings which he had devised and employed. Through a Pfannenstiel incision a " bucket-handle " of fascia about one inch in width was raised, each end remaining attached to a fleshy slip of the external oblique muscle of the corresponding side. The " bucket-handle " was then split from one extremity to the other so that each limb of the eventual sling would be equal to the full length of fascia originally raised. To the ends of each of these fascial strips ligatures were attached.

The urethra with its catheter *in situ* was then raised and steadied with specially devised forceps, while a Bonney-Reverdin needle (aneurysm pointed) was passed beneath it through the tissue of the urethrovaginal septum. The ligature was drawn back with its attached fascial strip. The needle was reversed and the other strip similarly brought into position, the loops of the sling thus crossing beneath the urethra. The recurrent loops were then attached to the rectus fascia.

The proximal loops of the sling could be brought to the urethral region by different routes: (1) behind the rectus muscles; (2) through the centre of the rectus muscles as suggested to him by Mr. Charles Read, of London; (3) medial to each rectus muscle; this is not recommended.

Recently Mr. Marshall had devised a much simpler operation whose immediate effects were excellent. A transverse strip of fascia was completely detached; one end of this was passed through the centre of the left rectus muscle a short distance above its origin, underneath the urethra and up through a corresponding point in the right rectus muscle. The ends were then overlapped in front of the muscles and firmly joined with three silk sutures; or the fascia itself could be knotted if this was preferred. Such an operation could be rapidly performed. Having a muscular support, the sling was less rigid than that of Aldridge or slings which had their origins and insertions in aponeurosis. He now proposed to give an extended trial to this operation.

Mr. Jeaffreson asked whether any difficulty had been experienced in passing the musculofascial sling in cases having had previous vaginal operations. Dr. Racker asked if the operation might produce residual urine as a permanent factor.

Dr. Hunter said that where similar operations had been done in large numbers fistulae had been produced, suprapubic drainage had been necessary, and in some a basal cystitis had occurred.

Mr. Marshall replied that he had not found difficulty in passing the musculofascial slings. The operation did produce residual urine for as long as 10 days. He left a catheter in the bladder for some days. A coudé or bi-coudé catheter was needed if further catheterization became necessary.

REVIEW OF CURRENT LITERATURE

INDEX

The Journal is fortunate in being able to run this Index in conjunction with the Abstracting Service of the British Medical Association. All the abstracts of this service which cover obstetrical and gynaecological literature and literature on the new-born are at our disposal. The Index will, however, contain in addition abstracts of articles which, though not of sufficient general interest for publication in the monthly volumes published by the British Medical Association, are yet sufficiently important for a specialist journal. It is to be hoped that our readers will collaborate in the preparation of these abstracts. Those who are willing to take part in the service are invited to communicate with the Editor, The Abstracting Service, B.M.A. House, Tavistock Square, London, W.C.1. There is special need of abstractors in foreign languages and when offering his or her services the writer should indicate the language (apart from English) in which he or she is proficient. The name of the abstractor will be acknowledged in the text and payment will be made at the rate of thirty shillings per thousand words.

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ANATOMY

87. **Morphology and Distribution of the Uterine Nerves.** (Osservazioni sulle caratteristiche morfologiche e distributive dei nervi dell'utero della donna.)

By N. DAMIANI. *Boll. Soc. ital. Biol. sper.*, **22**, 216–219, March 1946. 2 figs., 4 refs.

The author has studied the innervation of different segments of the uterus as to their possible influence on parturition. He used the Bielschowski-Gros silver method and Ruffini's gold impregnation. The minute details of anatomy cannot be given here. Suffice it to say that the fibres pass along the lateral borders upwards and downwards from just above the fornix and also penetrate transversely into the musculature. The majority of the fibres are non-myelinated, and many of those just above the fornix penetrating the uterus possess ganglia which are seen also on fibrils among the superficial muscle bundles of the cervix (intrauterine ganglia). Fibres in the parametrium also show ganglia (extrauterine ganglia) at the side of the fornix and cervix. The ganglia contain large multipolar and many smaller, rounded cells. Also, sympathetic fibres are furnished to the vessel walls.

The cervix is more abundantly supplied with nerves than is the body of the uterus and the nerve bundles are thicker in the former; those to the latter are not sheathed as a rule; a few myelinated may be seen among them, but the sheath is very thin and delicate. In the intravaginal part of the cervix is a diffuse non-myelinated network.

The author states that the interpretation of his findings are largely hypothetical, but he suggests that orthosympathetic and parasympathetic nerves each play their part; that the orthosympathetic transmit the main motor stimuli to the whole uterus, while the parasympathetic have an accessory excito-motor function, curbing and regulating not only the uterine contractions, but also, and even to a greater degree, controlling dilatation of the cervix.

H. Harold Scott

88. **A Discussion of Pelvic Variation and a Report on the Findings in 100 Negro Women.**

By H. THOMS. *Amer. J. Obstet. Gynec.*, **52**, 248–254, Aug. 1946. 2 figs., 11 refs.

Thoms adds to the records of his radiological study of the pelvis, male and female, by reporting his findings in 100 adult negro women delivered of their first full-time child in the New Haven Hospital. The study includes two consecutive groups of 71 and 29. As with other studies he has made, Thoms classifies the pelves into 4 groups: (1) dolichopellic, in which the antero-posterior diameter of the inlet is longer that the transverse; (2) mesatipellic, in which the 2 diameters are equal or the transverse is not more than 1 cm. longer than the antero-posterior; (3) brachypellic, in which the transverse is between 1 and 3 cm. longer than the antero-posterior; (4) platypellic, in which the transverse is 3 cm. or more longer than the antero-posterior.

In the 100 negro women the incidence of each group was as follows: dolichopellic, 29 per cent; mesatipellic, 43 per cent; brachypellic, 25 per cent; platypellic, 3 per cent; while the incidence in 500 white primigravidae was: dolichopellic, 22.6 per cent; mesatipellic, 46.6 per cent; brachypellic, 28.8 per cent; platypellic, 2 per cent. The author concluded that the female pelvis in both white and black races is subject to considerable variation, and that the tendency for the pelvis to retain its foetal and infantile general characteristics is favourably influenced by nutrition. On the importance of the effect of nutrition on the pelvis he agrees with Nicholson, Breus, Kolisko, Allen, and others.

J. Stallworthy

PHYSIOLOGY

89. **Adenosine Triphosphatase Activity of Lutein and Ovarian Tissues and Weight of Corpora Lutea during the Reproductive Cycle of the Rat.**

By C. BIDDULPH, R. K. MEYER, and W. H. MCSHAN. *Endocrinology*, **38**, 358–367, June 1946. 4 figs., 13 refs.

Adenosine triphosphatase plays a major part in the energy exchanges of muscle and other tissues during glycolysis. By analogy, investigation of the adenosine triphosphatase activity of corpora lutea and other parts of the ovary during the oestrus cycle, pregnancy, and lactation may help to determine the functional activity of these tissues.

The dissected and weighed corpora lutea and ovarian residue were placed in tapering tubes fitted with ground-glass rods for homogenization and glass-distilled water added to make a 1 per cent homogenate. The adenosine triphosphatase

was determined by the method of DuBois and Potter (*J. biol. Chem.*, 1943, **150**, 185) with slight quantitative modifications, the volume of adenosine triphosphate and trichloracetic acid used was increased (0.2 ml. for 0.15 and 0.1 ml. respectively) and was made with an Evelyn photometer of the inorganic phosphate in 0.3 ml. of the digest supernatant diluted in 10 ml. The activity was expressed in units defined as the amounts needed to liberate 1 μg. of inorganic phosphorus from adenosine triphosphate in 15 minutes at 37°C.

The activity per milligramme of corpus luteum was slightly higher in dioestrus than in oestrus, remaining steady during pseudopregnancy and early pregnancy and rose before delivery, and this rise was continued during lactation (litters reduced to 6 young), reaching a maximum of about 300 per cent of the normal at the eleventh day of lactation. The corpora lutea formed immediately after parturition showed normal activity during lactation but increased activity after weaning on the twentieth day when oestrus recurred. The weight of each corpus luteum increased about threefold between the seventh day of pregnancy and delivery and thereafter fell to subnormal weights by the eleventh day of lactation. The postpartum corpora lutea did not increase in weight until after weaning. When the activity per corpus luteum was calculated its course paralleled the changes in average corpus luteum weight.

The rate of progesterone secretion, as suggested by the evidence of other authors, is apparently inversely related to the adenosine triphosphatase activity of luteal tissue; periods of high secretion (early pregnancy and lactation) are periods when low activity is found in the corpora lutea of pregnancy and of the postpartum ovulation respectively. There is similar evidence of inverse relations between oestrogen production by the ovarian residue and its adenosine triphosphatase activity; this was high in early pregnancy or pseudopregnancy, but fell before the recurrence of oestrus.

The range of activity per milligramme of fresh tissue was 7–25 units in luteal tissue and 15–20 units in ovarian residue. The average corpus luteum weights lay between 0.5 and 2.9 mg. Three rats were used for each determination, and individual variations were relatively great.

Peter C. Williams

PREGNANCY

NORMAL

90. **The Elderly Primipara.**

By F. BENJAMIN. *S. Afr. med. J.*, **20**, 674–682, November 9, 1946. 46 refs.

The author applies the term elderly primipara only to " a woman giving birth to her first viable child at the age of 35 or over "; he points out that the abnormalities to which the " elderly primipara " is especially prone do not make their appearance abruptly, but may be seen at any age over 25. While it is true to say that a proportion of elderly primiparae undergo an uncomplicated labour easily and normally, this state of affairs must be regarded as the exception rather than the rule. In the vast figures collected for New York State in a 3-year period, where a series of 255,727 cases of labour was available, the elderly primipara constituted 1.2 per cent of this figure and 3.2 per cent of all primiparae. Therefore, the elderly primipara figures in 1 out of every 100 cases with which the obstetrician has to deal. Since the incidence of women having their first babies at the age of 35 or over is greater among the well-to-do than among the working classes, it follows that a lower incidence will be found among hospital patients than in private practice. There is no doubt that the percentage of elderly primiparae delivered in hospital has steadily increased of late years, but this may be accounted for by contingent circumstances, and it may be taken that in general there is no absolute increase.

Again using the New York State series of cases, the author demonstrates that while the mortality rate for the whole of the series was 0.269 per cent that for the elderly primipara was 1.348 per cent —a figure nearly five times as high. The mortality curve mounts steadily and increasingly steeply as age advances. Infantile mortality, too, shows a marked increase with the increasing age of the mother. An infant mortality rate of 5.98 per cent for all cases from the New York State series compares with a rate of 11.48 per cent where the elderly primipara is concerned. The toxaemias of pregnancy, accidental haemorrhage, and placenta praevia—all factors directly affecting maternal and infantile mortality rates—are to be found far more often in the elderly primipara than in the primipara of younger ages. Abnormal presentations are 1½

to 3 times as frequent in the older age-group. Uterine inertia, especially when occurring in the third stage, is one of the greatest risks which the elderly primipara has to encounter.

The author advises that antenatal care of the pregnant woman at or over 35 years of age should include routine X-ray pelvimetry, special attention being paid to the assessment of the pelvic outlet. The type of cervix and vagina should also be determined. Because of the pernicious effect of fear—so common in elderly pregnant women—special attention should be paid to the psychological factor. Caesarean section, with its relatively high mortality rate, should be avoided wherever possible, and its use reserved for the genuine obstetrical indication. The only rational approach to the problem of delivery is through the careful study of each case, and even when delivery is safely effected the problems of the puerperium demand that unremitting care should be exercised.

F. L. Cary

91. **Carbohydrate Content of Serum Proteins in Normal and Toxemic Pregnancy.**

By B. LUSTIG and J. NOVAK. *Exp. Med. Surg.*, **4**, 255–259, Aug., 1946. 18 refs.

Earlier investigation by the same authors has shown that hypoproteinaemia with decrease in the albumin-globulin ratio occurs in pregnancy and is particularly marked in the toxaemias. This has been regarded as the result of dilution of the blood due to water retention. The present paper describes qualitative changes in the serum proteins resulting from changes in their carbohydrate content estimated by the orcinol-sulphuric acid reaction. Globulin was precipitated by Kingsley's method, 15 ml. of 23 per cent sodium sulphate being added to 1 ml. serum in the presence of ether; the figures for globulin were calculated by subtraction of the estimated results of total protein and albumin. Eight normal non-pregnant women, 22 women during normal pregnancy, and 7 cases of toxaemia were investigated. Though total protein-carbohydrate was not significantly altered by pregnancy, the carbohydrate content of the albumin fraction was significantly increased in pregnancy. In toxaemic pregnancy protein-carbohydrate was increased both for the total protein and for the albumin and globulin fractions. Present results do not indicate whether this is due to alteration in composition of known proteins or to the appearance in the blood of new serum proteins.

R. H. D. Short

92. **Maternal and Foetal Tissue and Plasma-lipids in Normal and Cholesterol-fed Rabbits.**

By G. POPJAK. *J. Physiol.*, **105**, 236–254, Dec. 6, 1946. 11 figs., 21 refs.

93. **Discussion on Water Metabolism in Pregnancy.**

By W. H. NEWTON, G. W. THEOBALD and W. C. W. NIXON. *Proc. R. Soc. Med.*, **39**, 558–568, July 1946. 33 refs.

Newton divides the water of the body into three compartments: intracellular water, interstitial (or tissue) fluid, and blood plasma. The intervening barriers are, respectively, the cell membrane and the capillary wall. The former is impermeable to the majority of ions; the latter is thought to be permeable to all constituents of the plasma except protein. The adjustment of exchanges between plasma and tissue fluids chiefly depends upon an adequate plasma protein concentration, but the mechanical factors of pressure within the capillary lumen and within the tissue spaces are also important. Varying permeability of the capillary membrane is another possible factor. The ion distribution of the tissue fluid and of the plasma are so nearly identical that they may be conveniently grouped together as the combined extracellular fluid, the volume of which may be measured by studying the degree of dilution of a measured amount of sodium thiocyanate. Blood plasma volume can be estimated separately by a similar technique, using Evans blue, which is not diffused through the capillary endothelium.

In pregnancy the combined extracellular fluid is increased. According to Chesley (*Amer. J. Obstet. Gynec.*, 1944, **48**, 565) the average increase is 6.3 litres. Of this figure Chesley believes that the plasma accounts for 1.3 litres and the interstitial fluid for 2.5 litres. The remainder is included in the breasts, uterus, and products of conception. Newton examines these figures critically. He considers that since the normal ratio of interstitial fluid to plasma fluid is believed to be 4:1 an explanation is required for the apparent irregularity of division. Far from finding factors encouraging selective retention by the plasma, he points out changes operating rather in favour of an increased proportion of interstitial fluid, such as dilution of the plasma proteins, increased venous pressure in

the lower limbs (McLennan, *Amer. J. Obstet. Gynec.*, 1943, **46**, 63), and possibly increased capillary permeability. The reasons for water retention in pregnancy are obscure. Retention of sodium in the latter part of pregnancy occurs, but in such large quantities that, if osmotically active, it would require retention of a greater weight of water than the total observed weight gain. It is therefore apparent that at least a proportion of the retained sodium is osmotically inactive and hence caution is needed in attributing any portion of the water retention to this cause. Nevertheless it has been shown that during pregnancy administration of sodium chloride over a period of several days causes a weight gain which water balance estimations show to be due to water retention, and that subsequent withdrawal of the sodium chloride causes reduction of weight due to water excretion, Freyberg, Reekie and Folsome, *Amer. J. Obstet. Gynec.*, 1938, **36**, 200), while administration of oestrogens and progestogens can cause retention of sodium and water. (Taylor, Warner and Welsh. *Amer. J. Obstet. Gynec.*, 1943, **45**, 547).

G. W. Theobald states that excess tissue fluid can cause cerebral convulsions or oedema of the lungs, and the control of water balance is one of the most important functions subserved by the kidneys. The kidney shows a latent period before responding by diuresis to the absorption of water from the alimentary canal—a mechanism which may be explained by tubular re-absorption caused by posterior pituitary antidiuretic substance. Theobald examines the possible factors which may predispose to excessive water retention in the tissues in pregnancy. He agrees that the blood dilution allows of increased loss of fluid from the arterial end of the capillary loop, but that a correspondingly enhanced concentration of the plasma colloids at the other end of the capillary prevents any progressive loss of fluid to the tissues. Storage of sodium is not the sole or even the determining factor. The important causative agent is considered to be mechanical, increased venous pressure due to the weight and bulk of the pregnant uterus causing a general rise in the venous pressure throughout the body by the consequent restriction of diaphragmatic movement, and exercising a more direct action on the venous drainage of the lower limbs so long as the erect position is maintained. (McLennan, quoted by Newton, demonstrated significant increase in femoral-vein pressure even in recumbancy.) Support for this idea is found in the well-known increased incidence of water retention in primigravidae and in cases of plural pregnancy, and in the fact that a postpartum diuresis occurs shortly after delivery, while the blood is still hydraemic and sodium retention still exists. Theobald admits the possibility that this may result from withdrawal of the sex steroids, but, in the absence of evidence of increased sex steroids in the blood of patients suffering from oedema, he prefers to accept the mechanical factor as more important. He also discusses the question of weight gain in pregnancy, the major portion of which he accounts for as follows:

(1) Products of conception	...	11.5 lb. (5.2 kg.)
(2) Uterus and adnexae	...	2.5 lb. (1.15 kg.)
(3) Breasts	...	3.0±1 lb. (1.35±0.45 kg.)
(4) Increased blood volume	...	2.5 lb. (1.1 kg.)
		19.5±1 lb. (8.8±0.45 kg.)

Another cause of weight increase is nitrogen retention equivalent to more than 6 lb. (2.7 kg.) of protein or to 30 lb. (13.5 kg.) of tissue. This last figure seems so unreasonable that it may be assumed that the nitrogen is not stored as protein. Additionally, a few pounds of fat are generally laid down around the hips and waist. Water retention may further contribute to weight gain. One extra litre may be retained in the tissues in normal pregnancy, and in abnormal pregnancy 2 further litres (3 in all) may be accommodated without producing oedema or other untoward symptom. The weight of this additional 2 litres is less than 5 lb. (2.3 kg.) and this figure is important in toxaemia of pregnancy, for, if warning of impending toxaemia is to be gained from weight records, the significant occurrence would be a sudden gain of up to 5 lb. (2.3 kg.) between the twenty-eighth and thirty-sixth weeks of pregnancy. Water retention greater than this would cause symptoms.

The occurrence of oedema is dependent on alteration of capillary permeability by malnutrition, chemical poisons, or physical injury. Malnutrition may indicate either the effects of local congestion (such as the stagnation of heart disease) or the local effects of general malnutrition (as in ankylostomiasis and beriberi). In such cases of increased

permeability of the capillaries the oedema fluid may contain considerable amounts of protein. Excessive water retention is best prevented by a well-balanced, easily digested, attractive diet, containing adequate amounts of first-class proteins, vitamins, and minerals; regular bowel action, sufficient exercise, and mental health are also essential. It is not necessary to restrict the intake of table salt or of sodium bicarbonate. The water balance may be restored by restricting fluid intake, by diuretics, and by increasing the periods of rest in the supine position.

Nixon discusses oedema in pregnancy with particular reference to the frequent occurrence of oedema in the absence of toxaemia and to the correlation between vitamin B_1 deficiency and pregnancy toxaemia. The importance of hypoproteinaemia in causation is emphasized. In prevention of oedema Nixon recommends a high-protein salt-free diet, and condemns the prescription of low-protein diets in the treatment of mild pre-eclampsia. Slight oedema will often disappear with alkaline medication. Diuretics such as potassium or ammonium chloride are permissible, but mercurial diuretics should be avoided. In more severe cases rest in bed is essential, and for 24 hours fluid intake should be restricted to 500 ml. of 30% glucose. Thereafter daily fluid intake should be adjusted to a total of 50 ml. less than the urinary output in the previous 24 hours, the diet (1,200–1,500 calories) consisting mainly of sugar, skimmed milk, vegetables, and fruit. Diuresis may also be encouraged by the intravenous injection at 6-hourly intervals of 50–100 ml. of 50% glucose solution. During diuresis it is desirable to administer a daily dosage of vitamin B_1 10 mg., vitamin C 300 mg., nicotinic acid 100 mg., and riboflavin 5 mg. In hypoproteinaemia advantage may be gained from plasma transfusion.

W. I. C. Morris

94. **Composition of the Human Placenta. II. Lipid Content.**

By J. P. Pratt, M. Kaucher, E. Moyer, A. J. Richards, and H. H. Williams. *Amer. J. Obstet. Gynec.* 52, 665–668, Oct. 1946. 19 refs.

Lipids are important sources of nourishment for the growing foetus and, with the improved methods of analysis, it has been possible to determine the partition of the various lipid fractions in full-time placentas. Klaus emphasized that the different methods of preparing the tissue and the selection and use of solvents in the extraction process explain the diverse results hitherto published. Higuchi found in full-time placentas 0.85 g. of fatty acids per 100 g. of fresh weight; if the placentas were thoroughly washed only 0.54 g. was found, indicating that one-third of the first value came from the blood present. Bienenfeld showed that the lipid content diminished as pregnancy progressed, and her comparison of placentas of 3 to 5 months with placentas at term indicated a decrease in total petroleum-ether extract from 8.6 to 4.4% of the dry weight. Total cholesterol dropped from 2.25 to 0.37% of the dry weight and cholesterol esters from 1.25 to 0.12%. Watanabe, in the developing human placenta, demonstrated a progressive fall in total cholesterol, total ether-soluble phosphorus, total lipids, and total fatty acids. He showed that, in terms of weight of the embryo, at the fourth month of development the fats and lipids of the placenta are present in greater quantity than at any other time. From these results Needham points out a similarity between the developing placenta and the developing hen's egg. In both there is disintegration of the lipid, releasing fatty acids, phosphorus, and choline. Evidence of important nutritional functions of the placenta has been contributed by Boyd and Wilson, who have demonstrated the passage of phospholipids, free cholesterol and cholesterol esters through the umbilical cord to the human foetus.

In the present investigation, the lipid distribution was determined in nine full-time placentas. The dried material was extracted with hot ethanol, then with ethyl ether. The final extracts combined represented approximately a 3 to 1 mixture of alcohol and ether and were analyzed for sphingomyelin, total and free cholesterol, galactose, and acetone-soluble glycerol. From the analyses the quantities of total phospholipid, choline phospholipid, cephalin, lecithin, cholesterol ester, cerebrosides, and neutral fat were calculated. The total lipid in the placentas averaged 12.36% of dry weight, and neutral fat 3.51%. The average essential lipid was then 8.85% (total lipid minus neutral fat) with total phospholipid composing 6.79% of which 2.26% was cephalin, 3.55% lecithin, and 0.98% sphingomyelin. Cerebrosides averaged 0.53%, free cholesterol 0.99%, and cholesterol esters 0.54% of the dry weight.

F. J. Browne

95. **Composition of the Human Placenta. III. Vitamin Content.**
By J. P. PRATT, C. RODERUCK, M. CORYELL, and I. G. MACY. *Amer. J. Obstet. Gynec.*, **52**, 783–787, November 1946. 12 refs.

96. **Functioning of the Fetal Kidney as Reflected by Stillborn Infants with Hydroureter and Hydronephrosis.**
By L. J. WELLS and E. T. BELL. *Arch. Path.*, **42**, 274–276, October 1946. 25 refs.

97. **Hypoxemia of the Fetus.**
By H. F. TRAUT. *West. J. Surg.*, **54**, 379–383, October 1946. 6 refs.

The mechanism of the interchange of essential material between the foetal and maternal circulations is one of the most imperfect and, therefore, one of the most vulnerable that nature has produced. In the early stage of development this interchange takes place across the 2 layers of trophoblast, the villous connective tissue, and the foetal vessel wall. The disappearance of the Langhans layer later in pregnancy leads to a shortening of the distance between the circulation and makes the process easier at a time when the foetus is in greater need of nutritive elements and requires to excrete more waste products. The circulation of maternal blood through the intervillous spaces is extremely slow, giving time for the digestion and transmission of protein material. This stasis leads to low oxygen tension and makes the human foetus more vulnerable than any other mammal to any influence which affects a reduced oxygen tension. Compensatory mechanisms are the higher number of red blood cells in the foetal circulation than in the adult, and the greater efficiency of foetal homoglobin. Wislocki has shown that oxidative potentials may be available to the foetus from the anaerobic breakdown of glycogen. Despite these advantages the oxygen saturation of foetal blood constantly diminishes towards term, falling in the last 3 months from 50 to 28 per cent of saturation.

Haemovillous degeneration of the placenta with retroplacental clot formation (familial or toxaemic), anaesthesia and drugs, or maternal malnutrition may seriously impair the oxygen supply. Any of these conditions may be a possible cause of spastic paraplegia or of low-grade intelligence. Windle's experiments on animals support this hypothesis. Preston found that 97 out of 135 children who had been exposed to various degrees of hypoxaemia at or near term were suffering from serious difficulties of behaviour though of normal intelligence. The other 35 showed subnormal intelligence, or had locomotor difficulties or ataxia. Erythroblastosis foetalis may result in a similar clinical picture though of different aetiology. Premature separation of the placenta, and other accidents of childbirth such as prolapse of the cord, cord round the neck, and knots of the cord, while not causing foetal death, may damage the central nervous system from anoxaemia. In cyanotic conditions of the mother during pregnancy, an early recourse to oxygen inhalation may prevent foetal damage. Every effort, therefore, should be made by the obstetrician to protect the oxygen supply of the foetus.

D. M. Stern

98. **Further Observations on Prostigmine in Delayed Menstruation and Pregnancy.**
By D. PARRELLA. *West. J. Surg.*, **54**, 397–402, October 1946. 1 fig., 8 refs.

In 1939 Reynolds demonstrated a rise in the acetylcholine content of rabbit uteri after the administration of oestrin to ovariectomized animals. The presence of acetylcholine in the uterus causes hyperaemia. The following year Hechter, Lev, and Soskin suggested that the effect of oestrogens on the uterus was twofold: (*a*) the specific oestrogenic action not depending on hyperaemia, and (*b*) an action secondary to the production of hyperaemia. The relative importance of these two effects was discussed in relation to the importance of hyperaemia in the production of periodic menstrual bleeding in the human subject. Since uterine hyperaemia is, presumably, also conditioned by the parasympathetic nervous system, certain cases of amenorrhoea, it was argued, might be due to the influence on the parasympathetic of such factors as fear, emotion, and physical strain, rather than to endocrine deficiencies. In these cases there would be better results from pharmacological treatment than from endocrine.

Acetylcholine was considered unsuitable as a drug owing to its dangers, and a synthetic physostigmine-like compound, "prostigmine", was suggested instead. Prostigmine was shown to be a safe drug when administered to pregnant women. Certain limitations were appreciated, in that it has no effect on amenorrhoea due to an early meno-

pause, endocrine dysfunction, or local pelvic changes. Prostigmine, 2 ml., was administered on each of three successive days to 200 patients suffering from amenorrhoea on 216 separate occasions, each of which was counted separately in the statistical analysis. The injection of prostigmine was followed by the onset of menstrual flow in 77 of the 216 administrations. In 68 of these (88 per cent) bleeding occurred either during the course of the injections, or within 3 days afterwards—that is to say, within 5 days of the first injection. In the remaining 9 bleeding occurred after an interval of up to 15 days and had, therefore, a doubtful relationship to the injections. None of the individuals was pregnant. The length of previous amenorrhoea (up to 45 days) bore no relation to the length of time before the response. In the remaining 138 cases no menstruation followed, and of these, 137 patients were subsequently found to have been pregnant. The remaining patient (false positive) was undergoing an early menopause. In these patients no untoward symptoms developed as a result of the injections. A direct comparison between the value and accuracy of the Friedman test and of the prostigmine test in the diagnosis of pregnancy was not possible from the data obtained, as the Friedman test was performed at different times from the prostigmine test, and not on all the patients. In some cases, at least, the latter appeared to be more reliable.

D. M. Stern

99. **The Problem of " Postmaturity "**

By A. J. WRIGLEY. *Proc. R. Soc. Med.*, **39**, 569–574, July 1946. 25 refs.

Wrigley points out that pregnancy ending later than the expected date of delivery is not associated significantly with the birth of overdeveloped children. The difficulties in labour sometimes ascribed to postmaturity would be more correctly attributed to the size of the baby, and a large child is as likely to be found at or even before the expected date of delivery. The form of management is deprecated which, with the intention of preventing dystocia due to so-called postmaturity, insists on induction of labour at any set time in relation to the calculated date. Attempts should be made to assess accurately the size of the baby at each examination during the later weeks of pregnancy, and if the baby is thought to be large it may be expedient to induce labour. The thoughtless use of medical induction of labour in such cases as a test of maturity is unwise; medical induction should be reserved only for cases where it is necessary, and the obstetrician is prepared to attempt a surgical induction within a few days if drugs fail.

Wrigley notes the difficulties in assessing the bulk of the foetus by clinical or radiological means. He suggests that a large foetus with strong rigid limbs, filling a uterus which contains relatively little liquor amnii, is generally overdeveloped.

W. I. C. Morris

100. **A Thickness Technique in Radiographic Examinations of the Abdomen and Pelvis.**

By G. D. STEVEN. *Brit. J. Radiol.*, **20**, 58–60. February 1947. 1 fig.

101. **Some Applications of Prenatal Nutrition to Infant Development.**

By A. ST. G. HUGGETT. *Brit. med. Bull.*, **4**, 196–204, 1946. 5 figs., 60 refs.

There are two main prenatal factors—the genetic and the nutritional—which affect the chances of survival and the health of the infant. This paper gives a review of the work done on the nutritional factors. The curve of growth *in utero* becomes very steep in the last 3 months of pregnancy, more than two-thirds of the birth weight being acquired in the last 8 weeks; three-quarters of this is water. Depletion of the maternal food supplies lowers the birth weight. It has been demonstrated that the diet in the last 8 weeks of pregnancy affects not only growth of the foetus but also that of the mammary gland and the eventual milk yield. A decrease in birth weights has been observed in occupied European countries, together with an increase in neonatal mortality. In Britain diet restrictions due to the war have not been proved to lower the birth weight (Huggett, *Proc. Nutrit. Soc.*, 1944, **2**, 20). Hammond showed that the ratio of the weight of single lambs to the weight of individual twin lambs is proportional to the degree of nutritive impairment. Applying this ratio to the birth weights of London during 1938–1939 and 1941–1942, there is actually an indication of improved health and chance of survival.

The foetus can, to some extent, maintain its body weight when the maternal food is in short supply. Hammond (*Proc. Nutrit. Soc.* 1944, **2**, 8) proposed

the theory of partition of nutrients to explain this. This theory states that in early life the higher total metabolic rate of foetal tissues enables the foetus to compete successfully with the lower metabolic rate of the maternal tissues and in this way obtain its desired quota of nutriment. The placenta is also a competitor for nutriment, and in the human subject at full term is bears a ratio to the foetus of one-quarter to one-twelfth. Therefore, the larger the placenta the better the storage and diffusion capacity and so the greater chance of foetal survival.

The total iron present in the diet of the pregnant mother determines the severity and duration of the anaemia which occurs during the first year of life. The mother showing an active hypochromic anaemia usually has an infant with no anaemia at birth. Apparently the embryo with its higher metabolic rate has taken the available iron at the expense of the mother with her low metabolic rate. This is not a complete answer, as within the embryo the erythrocyte shows no iron deficiency at birth. Fullerton (*Arch. Dis. Childh.*, 1937, **12**, 91) regards the reserves of iron available to the erythrocytes as being in the blood itself apart from sources available in the food supplied in the postnatal period, and for this reason he emphasizes the importance of feeding iron to the infant, at the same time doubting the value of supplementary iron in the diet of the pregnant woman. The author considers that in view of the work of Strauss (*J. clin. Invest.*, 1933, **12**, 345) and Smallwood (*Brit. med. J.*, 1936, **2**, 573) it is doubtful whether Fullerton's conclusions are wholly correct. If calcium, phosphorus, and vitamin D are not supplied in the maternal diet in adequate amounts not only is the postnatal development of the infant affected but also a loss of calcium from the maternal tissues occurs, as the higher rate of metabolism of foetal bone growth *in utero* makes a priority demand on the nutrients required. The author concludes that the balanced diet in pregnancy is essential for foetal and infant health, quite apart from the obvious advantages conferred on the mother.

R. Winston Evans

102. **Maternal Diet, Infant Mortality, Breast Feeding, Child Health.**

By I. G. Macy. *Med. Wom. J.*, **53**, 21–26, October 1946. 9 refs.

Abnormal.

103. **Recurrent Eclampsia.** (Eclampsia de repetición ; notas de casuistica.)

By V. Notario Garcia and A. Garcia Hernandez. *Rev. esp. Obstet. Ginec.*, **5**, 92–99, August 1946. 21 refs.

Four cases of recurrent eclampsia are described. The incidence of eclampsia in these series was 1.4 per cent (25 cases in 1,727 pregnancies). The recurrent form occurred in 16 per cent of patients who had a previous history of eclampsia. Most authors confirm this increase in incidence. It is well known that eclampsia occurs mainly in primigravidae, and the relative rarity of recurrence is hard to explain. It is suggested that a process of iso-immunization takes place in eclamptic mothers, although it must be remembered that in many cases a woman who has once had eclampsia will receive prophylactic treatment in subsequent pregnancies and on this account may never pass the stage of pre-eclampsia. It is possible that in pre-eclampsia the motor cortex and the ganglia of the mesencephalon are in a state of excitability, and may be acted on by a variety of precipitating factors, any one of which may produce the convulsions of eclampsia. A review of the literature reveals no single specific agent. Certain factors in the cases described are considered in relation to eclampsia. Foetal factors include sex and number of foetuses, a higher proportion of male foetuses being noted in cases of eclampsia. In multiple pregnancy the incidence of eclampsia is greatly increased. Constitutional anomalies of familial distribution may be found in the mother, as well as vascular disorders, liver deficiency, or endocrine instability. The authors feel that eclampsia may arise from iso-immunization and that investigation should proceed along these lines.

[The suggestion in this article seem to be based on a very small number of cases.]

Josephine Barnes

104. **The Effect of Essential Hypertension on Pregnancy.**

By J. A. Sharkey and C. B. Hess. *Amer. J. Obstet. Gynec.*, **52**, 672–676, October 1946. 6 refs.

The authors define essential hypertension as an elevation of blood-pressure to 140 mm. systolic and 90 mm. diastolic or more, existing for 2 days or longer without any signs or symptoms of renal

disease. The patients studied were 115 women out of a series of 3,000 patients delivered consecutively in the Hospital of the University of Pennsylvania.

Fifty-two of the 115 patients developed albuminuria of varying degrees. The retinal fundi of 33 patients were examined. Twenty-one were found to have early sclerotic changes with some spasm, 2 showed marked arteriosclerosis, and 10 were normal One patient had an abruptio placentae in the eighth month of pregnancy. Eight patients had a blood-pressure of at least 200/100 at some time during their pregnancies. In 4 of the latter the pregnancy was interrupted by either therapeautic abortion or hysterotomy; the remaining 4 were delivered of normal infants at term.

Of 2,885 pregnancies not associated with essential hypertension 737 (25 per cent) ended in abortion, premature birth, or neonatal death. Of 115 pregnancies in this series 20 (17 per cent) ended in this manner. Blood-pressure was normal in half of the 90 women who were examined 6 weeks after delivery. The authors compare their incidence of unsuccessful pregnancy with that obtained by Dieckmann (21 per cent) and by Browne and Dodds (36.5 per cent).

[It must be emphasized, however, that the latter are dealing with quite a different type of case from many of those included in the present series—that is, with cases of hypertension with or without renal involvement and existing *before* pregnancy, in other words, with chronic vascular hypertension. In the authors' series, no limit appears to be set to the time in pregnancy at which the hypertension first appears. The consequence of this is that many cases must be included in which hypertension appears for the first time late in pregnancy, and which would therefore be classified by other authors as cases of pre-eclamptic toxaemia. This applies to patients in whom the first rise in blood-pressure occurs after the twentieth week of pregnancy.]

F. J. Browne

105. **Protein Depletion in Pregnancy Toxemia.** By H. SPITZER. *West. J. Surg.*, **54**, 392–393, October 1946. 9 refs.

Altogether 101 quantitative determinations of total serum protein, albumin, and globulin were made in Curacao on 89 coloured people in the low-income group (Kjeldahl method of nitrogen estimation). Seventy-one patients came in for their first antenatal examination round about the eighth month; 28 of these showed no oedema, and 43 had oedema. Thirty individuals, 18 non-pregnant women and 12 men, both groups without evidence of oedema, were used as controls. The results are shown in the table:

	Men	Non-pregnant women	Pregnant women without oedema	Pregnant women with oedema
AVERAGE VALUES				
Osmotic pressure (cm. water)	44.5	43.5	40.9	32.8
Total protein (g. per 100 ml. of blood) ...	7.9	7.7	7.3	6.5
Albumin (g. per 100 ml. of blood)	5.2	5.1	4.7	3.6
Globulin (g. per 100 ml. of blood)	2.6	2.6	2.5	2.9
MAXIMAL VALUES				
Osmotic pressure ...	50.3	54.2	54.5	47.4
Total protein	9.0	8.6	8.7	7.7
Albumin	6.1	6.0	7.7	5.8
Globulin	3.7	4.0	4.1	5.1
MINIMAL VALUES				
Osmotic pressure ...	38.0	35.5	30.9	16.0
Total protein ...	6.8	6.8	5.3	3.0
Albumin	4.2	4.3	3.2	2.1
Globulin	1.8	1.5	0.9	0.8

Osmotic pressure is associated with albumin and globulin only. The 4 different values for maxima and minima do not necessarily belong to a single case. There is a significant gradual decline in the level of the blood proteins in the order—males, non-pregnant women, gravidae without oedema, gravidae with pregnancy oedema. While in an average non-pregnant woman a reduction of the albumin level to 2.5 per cent and of the total protein to 5 per cent is supposed to be essential to cause oedema, it appears that higher protein levels are associated in pregnancy (albumin 3.6 per cent and total protein 6.5 per cent are average values in pregnancy oedema). The difference is explained by the increased venous pressure in pregnancy. There are cases of oedema produced by this factor alone. Oedema in pregnancy does not justify the conclusion that the blood proteins are reduced; therefore, it is essential in any such case to determine their levels. There is normally an increase in the total blood volume during the latter part of pregnancy. Some authors have claimed that the reduc-

tion of plasma protein is the result of dilution, overlooking the individual reduction of the albumin fraction. The maximal values found in the present observation suggest that pregnancy can take place without any reduction of the blood proteins, but the average values prove that such a reduction is very frequent.

D. M. Stern

106. **Oedema of Vulva due to Toxaemia of Pregnancy.**

By J. P. Bush. *Brit. med. J.*, **2**, 988, December 28, 1946. 1 fig.

The case reported is one of vulvar oedema so marked as to obstruct normal delivery. The patient, a young primigravida of 21 years, attended the antenatal clinic throughout her pregnancy. At the thirty-sixth week of pregnancy her blood-pressure was 150/95 mm. Hg. Two weeks later her blood-pressure was 150/105, and there was considerable albuminuria with gross oedema of legs, thighs, and abdomen. The patient was admitted to hospital, when it was found that there was also considerable oedema of the vulva. In spite of fluid restriction, a salt-free low-protein diet, and 3 mg. vitamin B_1 given thrice daily, the vulvar oedema became more marked; the urine contained 6 parts of albumin per 1,000 and the blood-pressure was 140/110. Urinary excretion was normal. Two days after admission to hospital the pregnancy was terminated by classical Caesarean section as the toxaemia was not responding to treatment and the vulvar oedema was so gross as to obstruct normal delivery. Catheterization was not possible. At operation the peritoneal cavity contained 1 to 1½ pints (568 to 852 ml.) of pale yellow fluid. A normal male child weighing 6 pounds 1 ounce (2.75 kg.) was delivered. After delivery the blood-pressure quickly returned to normal. The albuminuria cleared up after 10 days, and the oedema subsided within 10 to 14 days.

T. N. MacGregor

See also No. 91

107. **Discussion on Placenta Prævia.**

By C. H. G. Macafee, L. Phillips, J. Barnes, J. Young, J. M. Munro Kerr, A. W. Purdie, R. C. Thomas, J. Stallworthy, and F. J. Browne. *Proc. R. Soc. Med.*, **39**, 551-558, July 1946.

Macafee describes the policy of the Royal Maternity Hospital, Belfast, where in 1937 it was decided to allocate the 3 common emergencies to 3 different members of the visiting staff, all cases of antepartum haemorrhage being allocated to the author. He presents the results of 191 cases showing a single maternal death (0.52 per cent) and a total of 42 foetal fatalities (an uncorrected fatality rate of 22 per cent). The main object of treatment has been to reduce foetal mortality without unfavourably affecting the maternal condition. Since the most important cause of foetal death in placenta praevia is prematurity, this object is best attained by expectant treatment, as in this series.

Macafee advises the discontinuance of the terms "lateral", "marginal", and "central", with the substitution of Browne's classification into 4 "types" or "degrees" (F. J. Browne, *Antenatal and Postnatal Care*, London, 1946, p. 240). He points out the importance of the site of placental insertion of the umbilical cord in relation to foetal death. If the cord insertion is near the area where separation takes place, the foetus frequently dies when infarction of the separated placenta occurs. Apart from speculum examination, which should be carried out after the first bleeding, vaginal examination should be delayed until the end of the period of expectant treatment, and should then be carried out in the operating theatre with everything in readiness for Caesarean section, which is called for in Type III and Type IV placenta praevia (where the placenta covers the internal os) and also in cases where a placenta on the posterior wall reaches the internal os (that is, a Type II placenta praevia situated posteriorly; the dangerous nature of this type was stressed in discussion by J. Stallworthy). In other types of placenta praevia artificial rupture of the membranes will generally suffice.

The paper is discussed, with presentation of comparative statistics, by the other obstetricians named in the title.

W. I. C. Morris

108. **Causes of Prematurity. VIII. Influence of Infections, Chronic Disorders and Accidents on the Incidence of Prematurity.**

By E. W. Brown, R. A. Lyon, *and* N. A. Anderson. *Amer. J. Dis. Child.*, **72**, 189-201, August 1946. 3 refs.

The same authors have previously reported the results of their investigations of the relationship of maternal syphilis, toxaemia, and uterine bleeding

to premature onset of labour. The present analysis is carried out along similar lines, but the incidence of infections and chronic disorders in the series of 13,525 mothers was too low to permit statistical analysis. Of the entire series of 682 mothers who gave birth to premature infants only 8 per cent had acute infections, 7 per cent had chronic disorders, and fewer still had accidents and other complications. As in previous reports, the standard of prematurity was taken as a birth weight of less than 5 pounds 8 ounces (2.5 kg.) for white babies, and less than 5 pounds 3 ounces (2.25 kg.) for negro babies, these weights corresponding to comparable stages of development. With this adjustment the figures for white and negro mothers do not differ significantly.

Premature delivery occurred in 14 per cent of women who had acute infections during pregnancy (including tuberculosis, pneumonia, influenza, pyelitis, otitis, and acute gonorrhoea), in 10 per cent of women with chronic disorders (including heart disease, nephritis, and diabetes), and in approximately 10 per cent of those suffering accidents during pregnancy (including surgical operations) and complications of labour (such as abnormal presentations and premature rupture of membranes). All these conditions appeared to exert a slight influence in raising the incidence of prematurity above the figure of 5.5 per cent for women who had entirely normal pregnancies. The influence of chronic infections is not so clearly demonstrated in this analysis of single births as when complete family histories were examined, in which case the incidence of stillbirth was found to be distinctly high.

M. Baber

109. **Repeated Abortions, Miscarriages and Stillbirths. Value of Antisyphilitic Treatment.**

By R. G. Cross. *Lancet*, **2**, 754–755, November 23, 1946. 1 ref.

The incidence of repeated abortions, miscarriages, and stillbirths is low, being less than 0.4 per cent of 15,780 deliveries at the Rotunda Hospital in 3 years. It was decided that, since good results were obtained in treating these conditions in syphilitic mothers, it would be worth giving anti-syphilitic treatment to patients with no history of syphilis and in whom the Wassermann reaction was negative, but who had a history of repeated abortions, miscarriages or stillbirths. The results in 54 cases are given, and it is claimed that a marked improvement resulted. These 54 patients had previously had 55 live babies out of a total of 249 pregnancies, but after treatment they had 49 live babies out of 54 pregnancies. It is suggested that syphilis might have been present in some of the fathers of these babies.

[This work requires criticism on several grounds. First, the statistical data seem unreliable. Other factors than the giving of anti-syphilitic treatment may have been involved. For example, vitamin E and calcium were given. These were not cases of true habitual abortion since many already had living children, and 1 patient in the series had no less than 6 previous live births. If syphilis was suspected in the fathers of these babies why were tests not carried out on them to exclude this? Good results have been claimed in cases of habitual abortion with diverse methods, and the work of Malpas and others has shown that detailed analysis of a large series of cases is needed to prove the value of any one method of treatment. Many of the patients in this series were not seen until late in pregnancy, 11 out of the 54 not before the thirtieth week. Finally, anti-syphilitic treatment is not without inherent danger and seems to have been unjustified in these cases.]

Josephine Barnes

110. **Placental Changes in the Rabbit in Abortion Produced by Oestrogens.** (Alteraciones placentarias de la coneja en el aborto provocado por estrogenos.)

By R. Sammartino and O. Blanchard. *Obstet. Ginec. latino-amer.*, **4**, 533–549, July 31, 1946. 8 figs., 53 refs.

Many references can be found in medical literature to the effect of large doses of oestrogens on the pregnant rabbit, in which death and expulsion of the foetuses result. This has been attributed by various authors mainly to the primary effect on the corpus luteum. No studies of the histological lesion in the placenta are available, and these form the subject of the present article.

The material chosen consisted of rabbits in the second half of pregnancy (fifteenth to thirteenth day). It was found that a single injection of 0.25 mg. of oestradiol benzoate or 0.125 mg. of stilboestrol dipropionate would constantly produce abortion in rabbits 15, 20, 21, and 22 days pregnant. Expulsion of the foetuses occurred, 5, 6, or 7 days

after injection. Three series were studied, one series being a control, one being treated with stilboestrol dipropionate and killed at intervals varying between 4 and 65 hours after injection, and a third being treated with oestradiol benzoate and killed 8 to 144 hours after injection.

A description of the normal placenta in the rabbit is given. In animals injected with oestrogen the first change observed was vasoconstriction in the maternal uterine blood vessels. Later, inhibition of growth in the foetal ectoderm was observed, and by the twenty-fourth hour these changes, together with pyknosis in the nuclei of the foetal cells, were well marked. By the fortieth hour haematomata of the maternal blood appeared in the placenta. Sixty hours later the ovum was being detached and necrosis in the placental tissues was well marked. The authors think that oestrogens act directly on the foetal ectoderm. No apparent involutionary lesions were noted in the corpora lutea.

[It has long been known that oestrogens will procure abortion in the pregnant rabbit, though various theories have been put forward. It is good to have a satisfactory explanation of the mode of action of oestrogens and to find that they act apparently on the foetal tissues, or possibly through vasoconstriction in the uterus. In connexion with endocrinology these observations illustrate the fallacy of arguing from one animal to another. The results obtained in rabbits do not, in general, appear to apply with regard to the human uterus and endocrine system.]

Josephine Barnes

111. **Induced Abortion on Eugenic Indications.**
By T. KEMP. *Acta psychiat. Kbh.*, **21**, 417–427, 1946. 4 refs.

112. **Hydramnios.**
By L. C. RIVETT. *Amer. J. Obstet. Gynec.*, **52**, 890–893, December 1946. 4 refs.

113. **Endometriosis in Association with Pregnancy.**
By F. R. LOCK and R. T. MYERS. *Amer. J. Obstet. Gynec.*, **52**, 556–563, October 1946. 37 refs.

There has been an apparent increase in the incidence of pelvic endometriosis in recent years. A full review and summary is given of a paper by R. B. Scott (*Amer. J. Obstet. Gynec*, 1944, **47**, 608–632). Most of the present paper is concerned with the results given by Scott; it reiterates the conclusion that pelvic endometriosis is not a particularly dangerous complication of pregnancy and that treatment should be conservative in young patients with endometriosis or adenomyoma. Details are given of 2 personal cases where successful pregnancy followed conservative treatment for severe endometriosis.

[Apart from 2 extremely interesting case reports, in themselves a valuable addition to the literature, this paper contains little that is original.]

Josephine Barnes

114. **Cancer of the Breast and Pregnancy.** (Bröstkräfta och havandeskap.)
By K. KETTUNEN. *Nord. Med.*, **31**, 1747–1750, August 9, 1946. 17 refs.

Breast cancer is uncommon during pregnancy. The majority of cases occur in elderly multiparae. Pregnancy aggravates the condition, whether it has arisen before or during the event. This aggravation is due to the increased amount of oestrogenic hormones in the blood of the pregnant woman. Breast cancer arising during lactation is not so malignant, the amount of oestrogenic hormone being then lower. Where a case is diagnosed during pregnancy the latter should be interrupted before radical mastectomy is performed. Sterilization of all women suffering from breast cancer would be beneficial.—[From the author's summary.]

115. **Masculinization and Pregnancy: A Case Report.**
By R. W. BAIRD and E. B. ASTWOOD. *Bull. New Engl. med. Center*, **8**, 234–239, October 1946. 3 figs.

116. **Retroperitoneal Hemorrhage Complicating Pregnancy. Report of a Case.**
By C. T. O'CONNOR and J. J. BRADLEY. New *Engl. J. Med.*, **235**, 648–650, October 31, 1946. 6 refs.

The authors describe a case of retroperitoneal haemorrhage occurring in pregnancy. The patient, aged 38, had always been healthy and had one child 11 years old; the confinement had been normal. She was quite well during the antenatal period and had been carefully examined from time to time; when she was a week overdue she was admitted to hospital because she had developed pain in the left lower abdomen. Her general condition was quite good and the pain not severe, but

on vaginal examination a large mass was felt in the pelvis behind and to the left of the cervix. A diagnosis of fibroid likely to obstruct labour was made, and a Caesarean section was performed. At operation a large retroperitoneal haematoma was found in the true pelvis spreading up to the mesocolon. Convalesence was uneventful, but when the patient was examined 6 months later some thickening was still felt in the region of the haematoma and she had some pain. The authors refer to other cases of retroperitoneal haemorrhage reported in the literature. All of these were fatal and were initially associated with severe shock; the main haemorrhage was in the upper abdomen and especially in the region of the left kidney. The authors' own case thus differs greatly from the reported ones.

L. W. Lauste

117. **Terminal Ileitis with Obstruction and Abscess Complicating Pregnancy.**

By W. W. Babson. *New Engl. J. Med.*, **235**, 544–547, October 10, 1946. 10 refs.

A case of intestinal obstruction due to regional ileitis at the seventh month of pregnancy is described. Since the start of pregnancy the patient, a primipara, aged 25, had noted increasing constipation and some tenesmus, now and again with diarrhoea. Two months before admission there was sudden severe pain in the right lower quadrant of the abdomen. This gradually passed off and was followed by repeated attacks of milder abdominal pain and bouts of vomiting with a gradual worsening of the general condition. On admission to hospital the patient was gravely ill. A tender mass in the right side of the abdomen had pushed the uterus across to the left. The uterus was contracting strongly at intervals and the foetus was living. A barium enema revealed narrowing and fixation of the terminal ileum. The diagnosis of probable terminal ileitis with obstruction was made. The onset of severe pain 2 months previously was regarded as representing a perforation. A Miller-Abbott tube was passed and the following day operation was undertaken with continuous spinal analgesia. A large inflammatory mass was found involving the terminal 75 cm. of the ileum; the appearances were typical of cicatrizing ileitis with fistula and abscess. The ileum was divided well above the lesion, the distal end was closed and invaginated, and the proximal end was anastomosed to the transverse colon in an end-to-side manner. Recovery was complicated by jaundice, believed to be due to toxic hepatitis. Serum protein fell to 4.3 g. per 100 ml. in spite of repeated blood transfusion and the administration of intravenous amino acids and glucose. On the tenth day after operation the patient went into active labour and a living infant was delivered weighing 3 pounds (1.35 kg.). The baby lived only a few hours. On the fourteenth day the mother complained of severe pain in the lower abdomen and there were signs of spreading peritonitis. Further transfusions and penicillin were given and localization in the pelvis began to take place. Five days later a pelvic abscess was evacuated through the vagina. From this point on improvement was rapid. A year later she was reported as remaining well.

The author stresses the importance of paying full attention to symptoms of abdominal pain in pregnancy. This patient had, in fact, been admitted to 2 different hospitals during the 2 months of abdominal pain and vomiting which preceded her operation. On the first occasion she had been discharged with a diagnosis of gastro-enteritis, and on the second no diagnosis was reached and she was stated to present no evidence of disease. He notes how difficult the management of abdominal surgical conditions in pregnancy may be, and is guided by the rules that if delay is safe postponement of operation is advisable, but if operation is necessary the pregnancy must be disregarded. He summarizes the treatment of ileitis as follows. Acute non-obstructive lesions in the early stages should not be disturbed, since the aetiology is unknown and recurrence is frequent. Surgery is indicated for patients with obstruction, fistula, or abscess or for those who are unable to maintain weight and strength under adequate medical management. As to the type of surgery, he notes that excellent results have been reported both with the exclusion operation and with resection. He points out that in the case described there was no choice of the type of surgical procedure, fixation and inflammation completely ruled out resection. The result of exclusion in this case was so good that further surgery was not considered advisable.

H. J. Croot

118. **Acute Lymphatic Leukemia and Pregnancy.**
By J. R. ALMKLOV and A. HATOFF. *Amer. J. Dis. Child.*, **72**, 202–206, August 1946. 10 refs.

A case of acute lymphatic leukaemia in a pregnant woman is recorded. The patient, aged 26, complained of febrile symptoms about the twenty-eighth week of her second pregnancy. Examination showed generalized enlargement of the lymph nodes and spleno-hepatomegaly. The peripheral blood contained 170,000 leucocytes per c.mm. of which 95 per cent were lymphocytes. A haemorrhagic state developed, and she died after 3 weeks' illness. Postmortem, the usual features of lymphatic leukaemia were found, and the uterus contained a 7-months foetus, with talipes and spina bifida. The authors have found records of leukaemia associated with pregnancy in 84 instances. The placental barrier resists the passage of leukaemic cells, and there is no recorded example of a leukaemic mother bearing a leukaemic child. They recommend that leukaemia in pregnancy should be treated in the conventional manner, but that resort be made to Caesarean section if the mother's health is failing rapidly.

R. Bodley Scott

119. **Funicular Myelosis in Pregnancy.** (Funikuläre Myelose als Schwangerschaftserkrankung.)
By J. AIGINGER. *Wien. klin. Wschr.*, **58**, 688, November 15, 1946.

120. **Funicular Myelosis in Pregnancy.** (Funikuläre Myelose als Schwangerschaftserkrankung.)
By A. STINGL. *Wien. klin. Wschr.*, **58**, 688–689, November 15, 1946. 3 refs.

121. **Strangulated Umbilical Hernia Complicating Pregnancy.**
By W. C. NEWMAN. *Manitoba med. Rev.*, **27**, January 19, 1947.

122. **The Treatment with Massive Arsenotherapy of Early Syphilis Complicated by Pregnancy.**
By A. C. CURTIS and G. MORROW. *Amer. J. Obstet. Gynec.*, **52**, 284–290, August 1946. 16 refs.

It is claimed in this paper, published by the Department of Dermatology and Syphilology, University of Michigan Medical School, that massive arsenical therapy offers a rapid and efficient method of treating syphilis in pregnancy. The results of Jeans (*Amer. J. Syph., Gon. Vener. Dis.*, 1919, **3**, 114) and of Marshall (*J. Amer. med. Ass.*, 1934, **102**, 503) are quoted to show the high incidence of stillbirth, abortion, and infant mortality when pregnant women with latent syphilis are untreated. The results of Marshall, McKelvey, and Turner (*J. Amer. med. Ass.*, 1934, **102**, 503) and others are quoted to show that the foetal prognosis is proportional to the adequacy of antenatal anti-syphilitic treatment.

The good results of Sudusk and Shaffer (*Yale J. Biol. Med.*, 1942, **14**, 34), Rattner (*Amer. J. Obstet. Gynec.*, 1943, **46**, 255), and others with massive arsenotherapy by the 5-day drip method are recorded. The authors give their own results in 30 cases treated by the total injection of 1,200 mg. of mapharside with 260 mg. of bismuth. They then describe the treatment of 10 cases by a modified technique in which a total of 1,080 mg. of mapharside in 5 per cent glucose was given intravenously by daily injections with the associated administration of 4 doses of 130 mg. of bismuth subsalicylate in oil intramuscularly. Liver and renal function were tested and a blood count was made before treatment was begun. Neither abortions nor stillbirths occurred in this series. The fallacies of the testing of cord blood, of the Wassermann test, and of examination of the placenta are emphasized. The value of dark-ground examination of serum from the umbilical vein or infant's skin is also emphasized.

J. Stallworthy

123. **Syphilis in Pregnancy.** (Sifilis en el embarazo.)
By J. D. MESA RAMOS. *Bol. Soc. cubana Derm., Sif.*, **3**, 97–119, September 1946. 12 refs.

124. **Hysterosalpingography in Extra-uterine Pregnancy.** (Hysterosalpingografisk undersögelse ved extrauteringraviditeten.)
By B. NIELSEN. *Nord. Med.*, **32**, 2337, October 11, 1946.

This preliminary assessment of the value of hysterosalpingography in the diagnosis of extra-uterine pregnancy is based on 25 cases. Of these, 12 were found to have extra-uterine pregnancy, and in 6 of these hysterosalpingography had given a characteristic picture, in 5 a doubtful picture, and in 1 case there was no air entry into the tube. Of the remaining 13 patients hysterosalpingography excluded extra-uterine pregnancy in 8 cases by showing normal patent Fallopian tubes. Whether this method of investigation will find a place in diagnosis depends on whether it is accurate, whether other methods available are sufficient to

establish a diagnosis, and whether any special risk or inconvenience is attached to the investigation itself. Apart from the slight risk of lighting up infection which always attends this method of investigation there is no danger in its use in extra-uterine pregnancy. More details of its accuracy will be given in a later communication, but up to the present, though there is a group of cases where its results are doubtful, it has been found to give characteristic pictures which either make the diagnosis of extra-uterine pregnancy or definitely exclude it. In this connexion the possibility of false findings in cases of ovarian, intra-abdominal, or coincident tubal and uterine pregnancy must be remembered. The investigation is contra-indicated in the presence of acute infection. Its importance lies in the fact that it can exclude intra-uterine pregnancy and thus prevent unnecessary laparotomy.

J. W. S. Lindahl

125. **Bilateral Simultaneous Tubal Pregnancy.**
By J. F. MacDonald and V. E. Masters. *Amer. J. Obstet. Gynec.*, **52**, 850–853. November 1946. 1 fig.

126. **Foetal Bones in Urinary Bladder. Unusual Termination to Ectopic Pregnancy.**
By H. W. Forshaw. *Lancet* **2**, 716, November 16, 1946.

In the case here reported the patient, an African woman aged 38, married 15 years, with no children, attended an out-patient clinic in Nigeria, bringing with her a number of small bones which she stated she had passed in her urine on 3 occasions in the preceding 3 months. There was no history of haematuria, and no pain except when the bones were passed. The bones had the appearance of small vertebrae. A significant point in her past history was that 9 years previously she had become pregnant and had gone to full term when she was seized with severe abdominal pain accompanied by slight vaginal haemorrhage. The pain and haemorrhage lasted for less than a day and the swelling of the abdomen gradually subsided in 3 months. The bladder was opened and a mass of foetal bone was removed, among which part of a mandible, ribs, and skull bones could be identified. In view of the history and clinical findings the condition is considered to be the result of an old ruptured ectopic pregnancy which had ulcerated through into the bladder.

[This explanation, though no doubt correct, may perhaps be amplified. The history strongly suggests that pregnancy had in fact continued to term. The death of the foetus within the abdomen would be followed by the gradual absorption of everything but its bones.]

T. C. Clare

LABOUR

127. **Early Signs of Difficulty in Labour.**
By. G. F. Abercrombie. *Med. Press*, **216**, 420–423, December 4, 1946.

128. **The Use of Posterior Pituitary Extract in the First and Second Stages of Labour.**
By J. S. Brewer, G. M. Cooper, E. W. Franklin, J. S. Hunt, T. L. Lee, I. Procter, R. A. Ross, R. A. White and F. R. Lock. *North Carolina med. J.*, **7**, 568–569, October 1946. 7 refs.

The authors of this article are members of a Maternal Welfare Committee. After a brief historical review of the use of pituitrin in obstetrics, it is pointed out that the difficulty in its use arises from the large number of factors tending to produce variations in response of the uterus to the drug. Such factors are irritability of the uterus, rate of absorption of the drug, parity, duration of pregnancy, degree of distension of the uterine wall, and others less tangible. The great danger of unusual response is illustrated by the report of uterine rupture after a 2-minim dose. Dangers to the foetus arise: (*a*) from slowing of the blood flow in the utero-placental sinuses with abnormally violent or prolonged contractions and (*b*) from the fact the foetal head must bear the brunt of increased intra-uterine pressure, after the membranes have ruptured. A first injection of ½ minim of pituitary extract given accurately from a tuberculin syringe is recommended. Further doses, if required, may be increased by ½ minim a time and given at not less than 30 minute intervals. Ether inhalation should be available in case uterine tetany occurs. The following conditions must obtain: (1) true labour with contractions much less than average in strength and frequency must be present; (2) the uterine muscle must be inert, as seen by its denting on pressure with one finger at the height of a pain; (3) there must be no mechanical obstruction to delivery, the position and presentation must be known, and the presenting head must be engaged;

(4) either the membranes should be intact, or, if not, the cervix should be fully dilated and the head on the perineum; (5) at least 5 cm. dilatation of the cervix must be present; (6) the condition of the foetus must be good; (7) the obstetrician must not leave his patient. Contra-indications to the use of the drug are normal contractions, placenta praevia, abnormal presentations, and abnormally large baby, hydramnios, or twins. [N.B. Doses are not given in units in the article.]

S. S. B. Gilder

129. **Bracht's Method of Breech Delivery.** (Over de methode van Bracht bij stuitligging.)

By P. E. REYNDERS. *Belg. Tijdschr. Geneesk.*, **2**, 534–548, September 1946. 1 fig., 24 refs.

The author points out the still considerable child mortality (10 to 15 per cent) in spontaneous breech presentations delivered by the commonly used methods. He agrees with Schwarz (personal communication, 1945) that this mortality is mainly due to traumatic injuries of the abdominal viscera and to cerebral haemorrhages. He also stresses the findings of Brander (*Mschr. Geburtsh. Gynäk.*, 1937, **105**, 205) that there are twice as many mentally deficient children among those born by breech as among those born by vertex presentation (*Kongresbericht, International Kongres voor Verloskunde en Gynaecologie, Amsterdam*, 1938, **2**, 5, 93). Bracht has evolved a technique of delivery with which the margin of safety to the child and the mother is considerably increased. This technique is based on his observation that after the descent of the breech during a spontaneous delivery the back of the child rotates towards the mother's symphysis pubis, the shoulders and the head emerging in the transverse position and not in the antero-posterior, as commonly believed. Ruge claims that this is not the rule, there being individual variations, but Teufelmayer confirms Bracht's observation in many cases, while in other instances he has seen only the beginning of an unachieved rotation of the back. Bracht awaits the spontaneous descent of the breech and intervenes only when the inferior angle of the scapula has appeared. He then grips the child's body with both hands, the fingers of each hand on the back of the pelvis and the thumbs pressing the thighs flexed on the abdomen. The body thus held is rotated round the mother's symphysis until the child's back lands on the mother's abdomen. The shoulders emerge laterally, followed by the chin, nose, etc., sweeping the perineal floor. While this rotation is performed an assistant presses the head from above the symphysis towards the pelvic cavity. The whole manoeuvre takes only 3 minutes.

Bracht claims that mortality was nil in his 206 cases. With other workers mortality was 0 to 2.3 per cent; and their failures averaged 15 per cent, these being due to narrowed pelvis, extended arms, incomplete dilatation of the cervix. In such cases classical methods were adopted, only a negligible time being lost in attempting to apply Bracht's technique.

Reynders used Bracht's technique in 61 cases. There were 8 failures. Of the remaining 53, 4 children died in the first week from: polycystic kidneys (1), prematurity (weight 1,400 g. and 1,230 g.) (2) and cerebral haemorrhage (1). Only the last death could be ascribed to the technique. Among the 8 failures there were 2 deaths from cerebral haemorrhage; in both cases the arms were extended. Bracht's technique was also tried unsuccessfully in 3 cases of artificial extraction of the breech.

A. Lilker

130. **Breech Presentation and its Treatment.** (Die Beckenendlage und ihre Behandlung.)

By J. WEGLEITER. *Wien. klin. Wschr.*, **58**, 629–631, October 25, 1946.

131. **Manual Removal of the Placenta; a Benign Procedure.**

By C. W. SEWALL and D. COULTON. *Amer. J. Obstet. Gynec.*, **52**, 564–573, October 1946. 13 refs.

The authors do not believe that manual removal of the placenta is as dangerous a procedure as was formerly thought. They report the results in 45 cases in which the chief indications were blood loss, retention of the placenta, and advisability of exploring the uterus. They believe that the procedure should be carried out early to anticipate the onset of shock. The technique described differs little from that followed in most hospitals. Uterine packing is employed when necessary and ergotamine tartrate is administered as a routine after removal of the placenta. Transfusion or intravenous infusions are given when required.

The results show no mortality and a morbidity

of only 2.2 per cent. Records of 5 cases are given. Routine chemotherapy was employed in about half the cases, but the tendency was not to give it unless there was definite evidence of infection. It is concluded that manual removal is a relatively benign procedure if the patient is in good condition. A plea is made for a less rigid interpretation of the indications for manual removal and for earlier operation.

[This is a short series of cases, but there must be general agreement with the conclusions that manual removal performed early while the condition of the patient is good is preferable to repetition of Crédé's manoeuvre, or to waiting until shock has appeared.]

Josephine Barnes

132. **Present Status of Transfusion of whole Blood and its Derivatives in Obstetrics and Gynecology.**
By L. N. TISDALL. *Amer. J. Obstet. Gynec.*, **52**, 788–793, November 1946. 11 refs.

ANAESTHETICS, ANALGESICS

133. **Spinal Anesthesia—The Protector of the Baby in Cesarean Sections.**
By K. M. HEARD. *Curr. Res. Anesth.* **25**, 191–199, Sept.–Oct., 1946. 4 refs.

The baby born after administration of inhalation anaesthesia to the mother does not show the same spontaneous respiration or give the same lung-expanding cry as the baby delivered with other methods. It is not sufficiently appreciated that it is impossible to bring relief to the mother by sedatives or by inhalation anaesthetics without affecting the baby. The present investigation was designed to inquire into the effect on the infant and the mother of: (*a*) nitrous oxide or cyclopropane, (*b*) ether, and (*c*) spinal analgesia used for delivery by Caesarean section. The results of 360 Caesarean sections collected over 11 years are analyzed. Gas (nitrous oxide or cyclopropane) was given to 102 cases, ether to 73 cases, and spinal analgesia to 185. The patients anaesthetized by each of these three methods were divided into four groups: (*a*) normal mothers and normal babies, 202; (*b*) abnormal mothers (with toxaemia, cardiac decompensation, respiratory infection, metabolic dysfunction, and other affections) and normal babies, 90; (*c*) normal mothers and abnormal babies (with prematurity, heart disease, prolapsed cord, or developmental abnormalities), 16; and (*d*) abnormal mothers and abnormal babies. Of the 202 babies in group (*a*) 20 per cent required resuscitation after gas, 18 per cent after ether, and 1 per cent after spinal analgesia. Of the 90 babies in group (*b*) resuscitation was needed for 20 per cent after gas, 6 per cent after ether, and 2 per cent after spinal analgesia. Of the 16 babies in group (*c*) 25 per cent needed resuscitation after gas, 85 per cent after ether, and 20 per cent after spinal analgesia. Of the 52 babies in group (*d*) 41 per cent required resuscitation after gas, 78 per cent after ether, and 27 per cent after spinal analgesia. [Though these figures are suggestive, the sub-groups are in most cases too small for them to be statistically significant.]

It is evident from these figures that spinal analgesia is the least harmful to the baby, but before reaching a conclusion as to its value its effect on the mother must also be considered. Moderate or severe surgical shock occurred in 18 per cent of the mothers given gas, in 9 per cent of those given ether, and in 15 per cent of those given spinal analgesics. Post-operative respiratory complications occurred in 8 per cent of the mothers receiving gas, in 12 per cent of those receiving ether, and in 10 per cent of those receiving spinal analgesics. Various techniques for spinal analgesia were used. In the one recommended as little pre-operative sedative was given as possible; ephedrine 30 mg. was administered with neosynephrine 0.2 ml. 10 minutes before lumbar puncture; 120 to 150 mg. of procaine crystals dissolved in 4 ml. spinal fluid was injected intrathecally slowly and without barbotage. An operating position with head lowered not more than 5 degrees was adopted, a change being made to the Trendelenburg position, if necessary, after 10 minutes, but only if intercostal movement was seen to be present. Blood pressure was supported throughout by pressor drugs or intravenous infusions.

Ronald Woolmer

134. **Spinal Anesthesia in Vaginal Deliveries. Report of One Thousand Inductions.**
By E. W. CARTWRIGHT and W. C. ROGERS. *West J. Surg.* **54**, 346–351, Sept., 1946. 35 refs.

This paper is an attempt to establish, by statistics based on 1,000 cases, the authors' belief that spinal analgesia, properly used, is the safest and most effective of all methods known to-day

for the relief of pain in the latter part of labour, and for delivery and repair. They elaborate and emphasize the qualifying phrase " properly used ", defining it as the employment of a scrupulously careful technique by an expert. The disappointment that followed the first enthusiasm at August Bier's introduction of it in 1899 they attribute chiefly to " misuse amounting to incompetence and bungling ". They criticize also, as misleading and chaotic, the mass of figures, covering a period of 40 years, on which the condemnation was based.

In their series of 1,000 cases the spinal analgesic was given when it appeared that delivery would occur within 1 or 2 hours, the time therefore depending on the frequency and strength of the pains. Generally primiparae were anaesthetized with the cervix 8 to 9 cm. dilated; multiparae with a dilatation of 6 to 7 cm. " Seconal ", often combined with " demerol " (pethidine), was given as a routine earlier in labour. Spinal analgesia was induced with the patient in the left lateral position, the spine being well flexed and the shoulders perpendicular to the table, the head of which was raised 1 to 2 in. (2.5 to 5 cm.). The injection was made through the lumbo-sacral interspace with a 20 to 22 gauge needle; occasionally the space above had to be used. The anaesthetic agent they are using at present is 10 mg. of pontocaine (amethocaine) in 2 ml. of 10 per cent glucose solution, though in the series here reported a variety of agents was used: procaine alone, in doses of from 50 to 100 mg.; pontocaine alone, up to 10 mg.; a combination of procaine, 50 mg., with pontocaine, 5 to 8 mg.; and sometimes " nupercaine " (cinchocaine) in 10-mg. doses. All drugs used were dissolved in 2 or 3 ml. of spinal fluid. Blood pressure, respiration, and pulse were checked every 15 minutes, and ephedrine was given if there was a marked drop in blood pressure. This, however, was rare, the great majority of patients not experiencing any significant fall. If the skin anaesthesia is kept down to, or below, the level of the umbilicus, a marked drop does not occur. The following are considered to be contra-indications; spinal deformities and spinal cord lesions; emotional conditions, such as fear; a blood pressure below 100 mm. systolic; skin infection; and haemorrhage. There was no maternal mortality nor mishap of any kind, and unpleasant reactions were few and mild.

T. C. Clare

H

135. A Report of 100 Cases of Trilene Analgesia in Labour.

By A. P. Barry and D. O'Connor. *J. med. Ass. Eire*, **19**, 188–189, Dec., 1946. 2 refs.

In the last 2 years there has been increasing interest in the use of trichlorethylene (" trilene ") as a self-administered analgesic in labour. Trilene is a blue volatile liquid with a rather pleasant odour, which can be used as an analgesic and an anaesthetic. (Trichlorethylene is colourless. The commercial product, trilene, is artificially coloured. Its volatility is low.) It can be conveniently administered by Freedman's inhaler. This paper is an analysis of its use at the National Maternity Hospital, Dublin, in 100 cases. There was only 1 case of cardiovascular disturbance (with a rise in maternal, and a fall in foetal, heart rate) though the group included hypertensive and toxaemic cases. No respiratory disturbances were noted. There was no evidence of renal damage in the normal cases, and no deterioration of the renal condition in the 19 cases of toxaemia included in the group. No nerve palsies were observed.

Administration was begun in primigravidae towards the end of the first stage, and in multigravidae as soon as they were having good pains every 5 minutes. Labour was prolonged in 4 cases, quickened in 29, and unaltered in 65. The administration was stopped in 1 case because of hysteria, and in 1 because of tachycardia. Forceps were used (under ether) in 5 primigravidae because of failure of the head to advance; the failure may have been attributable to trilene in one of these cases. Trilene analgesia for perineal repair was effective in 20 out of 24 cases. In no case was the third stage prolonged. Temporary foetal distress imputed to the trilene occurred in 1 case only. There was no attributable foetal morbidity. The longest time of administration was 9 hours. The amount of trilene used was ½ to 1 oz. (15 to 28 ml.) in the average case. There was no difficulty in combining it with ether or chloroform when necessary. Five patients were dissatisfied, but 4 of these were temperamentally unsuited to any method of analgesia; 22 were satisfied, and 72 " very satisfied ". Analgesia with trilene was more successful than with gas and air with the apparatus set to deliver 60 per cent of nitrous oxide instead of the usual 45 per cent (the practice at this hospital), and was preferred by those who had experienced both. The average cost

was 4*d*. per case, compared with 6*s*. 8*d*. for gas and air. Portability and simplicity are further recommendations.

Ronald Woolmer

136. **Addition of Penicillin Sodium to Anaesthetic Agent for Local Infiltration Anaesthesia. Preliminary Report.**

By V. J. REYNOLDS. *Amer. J. Obstet. Gynec.*, **52**, 641–644, Oct., 1946. 10 refs.

The author had found that the results of perineal repairs after delivery were often unsatisfactory. This was believed, after a review of all possible causes, to be due to two factors—impaired circulation and infection. To eliminate the latter the use of penicillin was considered. For 81 consecutive repairs of incisions or lacerations a local infiltration was made of 1 per cent procaine hydrochloride in normal saline, to which 250 units of freshly made penicillin sodium were added per ml. of the solution. This mixture was freshly prepared at the time of each delivery. An average of 45 ml. was injected subcutaneously, intramuscularly, and submucosally into the vulvo-vagino-perineal area by infiltration. In 2 patients pudendal nerve blocks were done, 15 ml. being injected into the area around Alcock's (pudendal) canal on each side. In 77 cases the results were excellent. While in the other 4 healing was not by first intention, there was no evidence of infection in any. The author considers the results sufficiently encouraging to warrant further study.

F. J. Browne

PUERPERIUM

137. **Levels of Penicillin in the Blood after the Use in the Vagina and Rectum of Suppositories containing Penicillin Calcium: Preliminary Report.**

By S. B. LOVELADY, L. M. RANDALL, and S. M. HOSFELD. *Proc. Mayo Clin.*, **21**, 401–403, Oct. 16, 1946.

In a group of women in an uncomplicated puerperium, suppositories of 100,000 units of penicillin calcium were inserted into the vagina or rectum. Among 36 cases in which the vaginal route was used, concentrations of 0.06 unit or more of penicillin per ml. of blood serum were still present in the majority 3 hours after the insertion of two or three suppositories. The blood levels after the use of one suppository were below this standard. In 33 cases in which the rectal route was used slightly lower average concentrations were obtained in the blood serum after 3 hours. The blood levels 5 hours after insertion of the suppositories were frequently below the standard level of 0.06 units per ml., and in a proportion of cases had fallen to nil. Although these results were obtained in the majority, there were some cases in both experiments in which absorption had apparently completely failed and blood levels of zero were recorded. The authors do not refer to these failures, but consider that the suppositories might be used as a routine prophylactic measure in the preparation of patients for delivery, especially where premature rupture of the membranes has occurred and before Caesarean section. They state also that the suppositories have given good results in the treatment of acute vaginitis in ambulatory patients.

[This method of prophylactic administration, while convenient, seems to be uncertain in action and somewhat wasteful of penicillin.]

H. Stanley Banks

138. **The Use of a Pessary as an Adjunct to Early Rising in the Puerperium.**

By C. W. PAVEY. *Ohio St. med. J.*, **42**, 1047–1049, Oct., 1946. 18 refs.

The author advocates routine low forceps delivery of primigravidae and multiparae, with a median episiotomy sutured by catgut. The placenta is expressed, ergotamine tartrate is given intravenously, and a Smith-Hodge pessary is inserted. The pessary is not used when there are extensive vaginal tears because of the pain caused by pressure on abraded areas. Within 4 to 14 hours of delivery the patient is propped up erect in bed for 15 minutes and she then gets up out of bed and stands on the floor for 2 to 5 minutes. It is recommended that two nurses should be in attendance. Later the same day the patient sits up in a chair for 15 to 30 minutes, and the following day she gets up at least three times and walks about the room. On the third and fourth day she can walk about the hospital and on the seventh day she is discharged. In the author's opinion the alleged dangers of early mobilization of puerperal patients, such as prolapse, perineal wound disruption, displacement, haemorrhage, and embolism, are all reduced in incidence by the routine he advises. In

the first year of trial the procedure was adopted in 366 private patients—204 multiparae and 162 primiparae—but in only 233 were pessaries fitted. The author is enthusiastic about his results and states that with few exceptions his patients welcomed the routine. *J. Stallworthy*

139. **Pulmonary Embolism in Obstetrics and Surgery.** (El embolismo pulmonar en clínica, obstetricia y cirugia.)

By E. S. MAZZEI, D. TAYLOR GOROSTIAGA, and E. MAGALHAES. *Prensa méd. argent.*, **33**, 1851–1854, Sept. 13, 1946.

140. **Electrotherapy of the Levator Muscle of the Anus (Levator Ani) during the Postpartum Period and in Some Gynecologic Conditions.**

By H. VIGNES. *West. J. Surg.*, **54**, 394–396, Oct. 1946.

Electrical stimulation of the levator ani muscles is suggested as being beneficial to women in the puerperium, and to those in whom there is weakness of the muscles. A bowled metallic electrode (1 cm. diameter) enclosed in an ebonite ball placed in the rectum and a large condensing plate (15 × 20 cm.) covered with a layer of fine felt and chamois leather are the two terminals. The stimulation is obtained by superimposing a continuous current of 12 to 25 milliamperes upon an alternating current of 5 per cent of this strength, with a frequency of 50 mA. [? per second]. Some remarkable claims are made about the benefits obtained, but no controls were used and much of the improvement seemed to be in subjective symptoms only. The value of the treatment may best be illustrated by the following quotations. A case of incipient prolapse in a recently delivered woman, aged 32, was cured after 5 treatments. Six women who came complaining of abdominal heaviness, tiredness, and impossibility of prolonged physical exercise all felt relief after 1 treatment. Four cases of incontinence of urine in women of varying ages (60, 40, 40, and 31 years) were cured after a number of treatments varying from 5 to 12.

D. M. Stern

141. **Penicillin in Treatment of Acute Puerperal Mastitis.**

By M. D. TAYLOR and S. WAY. *Brit. med. J.*, **2**, 731–732, Nov. 16, 1946. 2 refs.

Taylor and Way have contributed a brief study of the use of penicillin in the treatment of acute puerperal mastitis. They refer to the fact that the results of this type of treatment are often unsatisfactory despite the fact that, since the causal organism is the *Staphylococcus aureus*, one would expect penicillin treatment to be effective. The authors attribute the disappointing results experienced by other workers to inadequate dosage and to the use of local therapy only, and quote Vaughan Hudson's conclusion that local penicillin treatment is not successful in soft-tissue infections unless they are entirely confined to the surface—a state of affairs which does not usually obtain by the time a diagnosis of acute puerperal mastitis can be made.

Two measures are necessary for the treatment of the condition: the breast must be effectively emptied and the infection adequately controlled. The emptying of the breast should, if possible, be effected by permitting the child to feed, but, if this should prove impracticable, then suckling is temporarily discontinued and small doses of stilboestrol are administered—usually not more than 1 mg. in 24 hours. The infection can be controlled effectively only by the systemic administration of large doses of penicillin. The authors advise 3-hourly injections of 12,000 to 20,000 Oxford units. All of the 10 cases reported by the authors yielded completely to this regime within periods varying from 2 to 7 days from the beginning of treatment, and in all but 1 case lactation was not interfered with. The total dosage of penicillin administered varied from 300,000 to 1,050,000 Oxford units. While admitting that these cases represent a somewhat limited experience, the authors are confident that the treatment suggested is worthy of extended trial. *Falkland L. Cary*

142. **The Health Centre's Part in the Prevention of Puerperal Sepsis.**

By C. M. MARTIN. *J. Obstet. Gynaec., Lahore.*, **7**, 127–133, Aug. 1946.

THE INFANT

143. **Prolapse of the Umbilical Cord.**

By S. B. GUSBERG. *Amer. J. Obstet. Gynec.*, **52**, 826–829, Nov. 1946. 6 refs.

144. **Congenital Hyperplasia of the Islets of Langerhans in Foetuses of Diabetic Mothers.** (Kongenital hyperplasi av Langhans' öar med ökning av β-cellerna hos foster till diabetiska mödrar.)

By G. T. HULTQUIST, I. LINDGREN, and J. B.

DALGAARD. *Nord. Med.*, **31**, 1841–1845, Aug. 16, 1946. 3 figs., 45 refs.

Three cases of pregnancy in diabetic subjects are described; in 1 case an improved carbohydrate tolerance was seen, which permitted reduction of the insulin dosage. The foetuses were born dead, and a histological examination of the pancreas was carried out. Sections were stained by the Gros-Schultze silver impregnation method, by which α-cells are stained and the β-cells unstained. The relative proportions of the two kinds of cells were estimated, and it was found that the proportion of α-cells was one half the normal value. New formation of islets was seen, consisting mostly of α-cells, with a differentiation of islet cells into β-cells occurring mostly in the larger islets. Examina- of other foetal organs revealed fatty infiltration of the liver and kidneys with deposition of glycogen. The adrenals showed cortical hyperplasia with haemorrhage in 2 cases.

D. J. Bauer

145. **Maternal Rubella as a Cause of Congenital Defects.**

By L. G. PARSONS. *Brit. med. Bull.*, **4**, 193–196, 1946. 10 refs.

In 1941 Gregg, an Australian ophthalmologist (*Trans. Ophth. Soc. Aust.*, 1941, **3**, 35), encountered an unusual form of congenital cataract in a number of infants, and following this up in co-operation with his colleagues he was able to collect a total of 78 such cases. Frequently these babies were small at birth, ill nourished, and difficult to feed, and 44 of them suffered also from congenital heart disease. He found that 68 of the mothers of these infants gave a history of rubella during pregnancy; this disease had most often occurred during the first or second month of their pregnancy. In a footnote it is stated that Gregg has now collected a total of 206 examples of this association between maternal rubella and congenital defects.

Following on this observation, a survey was sponsored by the National Health and Research Council of Australia. Information concerning 74 mothers who had suffered from rubella during pregnancy or had congenitally defective offspring was collected. Of these mothers 57 had suffered from rubella and their offspring manifested congenital defects, involving the eye, the heart, the ear, or the general mental development. Not infrequently more than one defect was present in the same child; moreover, many of these infants were under-nourished and difficult to feed. These investigators came to the conclusion that " When a woman contracts rubella within the first 2 months of pregnancy it would appear that the chances of her giving birth to a congenitally defective child are in the region of 100 per cent, and if she contracts it in the third month about 50 per cent ". A few cases have now been reported both in England and in America which lend support to this association.

[The evidence from Australian observations does support the view that these defects are due to rubella, but before it can be considered proven further statistical and other studies are required. This will not be easy, for large epidemics are infrequent and the population at risk is small. To obtain really good statistical results it would be necessary to include in the survey *all* married women in England and Wales. A recent editorial (*Brit. med. J.*, 1946, **2**, 778) states that rubella during the early months of pregnancy has something less than a 10 per cent chance of damaging the foetus.]

Jas. M. Smellie

146. **Congenital Deformities.** (Aangeboren misvorming.)

By A. THOLEN. *Geneesk. Tids.*, **24**, 338–340, December 5, 1946.

147. **The Toxic Diseases of the Newborn. Preliminary Report.**

By J. A. FREEL. *Arch. Pediat.*, **63**, 440–478, September 1946. 4 figs.

The author defines toxic disease of the newborn as one caused by poisons produced by the hydrolysis of the exotoxins of spores on the carbohydrates, proteins, and fats present in the infant's diet. He holds that epidemic diarrhoea of the newborn is not an infectious but a toxic disease caused by the presence in the infant's food of butyric acid, acetic acid, and propyl and butyl alcohols. He brings the following evidence to support this view: (1) *Clostridium butyricum* and *Bacillus subtilis* were isolated from 6 cans of evaporated milk obtained from a hospital using such milk for infant feeds during an outbreak of epidemic diarrhoea. (2) Clostridia were isolated from 39 of 40 cans of evaporated milk brought in as suspect by mothers of infants; pure cultures of the organisms were not obtained. (3) Contamin-

ated milk administered to 2 kittens produced severe symptoms. (4) Contaminated milk was found to contain fairly large quantities of acetic acid (up to 1.2 per cent) and butyric acid (up to 1.12 per cent), and small quantities of butyl and propyl alcohols. (5) Experiments on 4 kittens showed that while butyric acid given by mouth produced gastritis, isopropyl alcohol given subcutaneously in evaporated milk (5 ml. of a 10 per cent solution) caused diarrhoea, restlessness, convulsions, and coma. Similar results were obtained with butyl alcohol.

The author concludes that it is possibly the prophyl and butyl alcohols in contaminated milk which cause death in infantile enteritis. He also concludes that such diarrhoea of infancy should be treated primarily as a chemical poisoning. Hence the gastro-intestinal tract should be emptied as soon as the diagnosis is made by gastric lavage and alkaline enemata. Alkalis should also be given by mouth. He describes 3 cases treated successfully by these methods, and adds that he has treated over 100 cases in the last 3 years.

F. A. Langley

148. **Persistent Vomiting in Infants Treated by Continuous Nasal Drip-feeds.**

By T. N. NAUTH-MISIR. *Brit. med. J.*, **2**, 737, November 16, 1946. 1 ref.

Good results are claimed for this technique, which is simple and easily mastered by trained nurses. The author uses a soft rubber catheter (size 4 to 6) which is lubricated and passed via the nose into the stomach. The prescribed feed is contained in the bottle of the standard blood-transfusion set which is then connected to the catheter. The required volume of the mixture prescribed is dripped slowly into the stomach over 24 hours or longer, a rate of 8 drops per minute delivering 20 ounces (568 ml.) in 24 hours approximately. The maximum amount of rest is obtained by this method, which can be combined with sedation; where this is indicated the food requirements of the infant can, theoretically, be maintained over a long period.

[Brenneman, however, has reported a fatal termination due to ulceration and oedema of the oesophagus following " too prolonged use " of the method without interruption.]

M. Baber

149. **Modification of the Ericson and Johnson Resuscitator.**

By C. W. PAVEY. *Amer. J. Obstet. Gynec.*, **52**, 867–868, November 1946. 1 fig.

150. **Spontaneous Pneumothorax in the Newborn.**

By E. P. SCOTT and C. C. ROTONDO. *Amer. J. Dis. Child.*, **72**, 207–210, August 1946. 3 figs., 12 refs.

The authors report a case of spontaneous pneumothorax, occurring in a 5-day-old infant delivered by Caesarean section, and refer briefly to the literature of this condition as it occurs in newborn infants. Case reports are relatively rare, but in one series of routine radiographic studies of 702 newborn infants Davis and Stevens (*Amer. J. Obstet. Gynec.*, 1930, **20**, 73) reported finding 6 instances of spontaneous pneumothorax. Clinical signs and symptoms may easily be overlooked. Trauma during delivery is presumed to play a major part in causation, but 5 other cases have been reported where the infants were delivered by Caesarean section. The infant described was a girl, apparently full-term, delivered by Caesarean section under spinal analgesia on account of placenta praevia. At birth she was cyanosed but breathed normally, and resuscitation consisted of extraction of mucus only. On the fifth day of life she was found to have a temperature of 103.6°F (39.8°C.) and to be dehydrated. Her weight had dropped by 19½ ounces (553 g.). She was again cyanosed and lethargic, and had one mild convulsion. Examination failed to reveal any abnormal signs, but a skiagram of the chest showed a right pneumothorax. Oxygen was given for 2 days with treatment for dehydration, and gradual improvement followed. Five days after the first X-ray examination the chest was found to be normal radiographically. It is emphasized that treatment should be conservative.

M. Baber

151. **Icterus Gravis Neonatorum. End-results of Treatment by Blood-transfusion.**

By H. THIRD. *Lancet*, **2**, 635–636, November 2, 1946. 6 refs.

The end-results of treatment by blood-transfusion of 6 infants suffering from icterus gravis neonatorum are given. At the time of the review the average age of the babies was 18 months. In 4 cases the father's blood was Rh-positive and the mother's Rh-negative with Rh antibodies in the

maternal serum. There was also a typical family history in each case, one or more normal infants being followed by affected siblings. The other 2 cases were in twin girls; the blood of both parents was Rh-positive (father, A R R; mother, O R R). No antibodies were found in the maternal serum. The mother had previously given birth to a stillborn anencephalic monster followed by a miscarriage at 3 months. For transfusion, group O Rh-negative blood was used until the relevant typing was completed, the amount of blood given being 10–20 ml. per pound of body weight. Artificial feeding was used. Of the 6 infants, 3 became normal healthy babies, 1 was an imbecile, 1 was suspected of spasticity and backwardness, and 1 of the twins also became spastic and backward.

F. A. Langley

152. **A Summary of Present Knowledge of Human Blood-Groups, with Special Reference to Serological Incompatibility as a Cause of Congenital Disease.**

By R. R. RACE. *Brit. med. Bull.*, **4**, 188–193, 1946. 6 figs., 42 refs.

The author stresses the fact that haemolytic disease of the foetus and newborn child is almost always due to Rh group incompatibility, but quotes the few rare exceptions. He also casts doubt on the conclusion of some American authors that there is any abnormal Rh-group distribution of mothers of primary mental defectives.

[This is a very concise and lucid summary with examples of the effect of blood group incompatibility on babies and should be valuable to all clinicians interested in the subject.]

John Murray

153. **The Blood Group Rh. I—A Review of the Antigenic Structure and Serological Reactions of the Rh Subtypes.**

By D. F. CAPELL. *Brit. med. J.*, **2**, 601–605, October 26, 1946.

The Blood Group Rh. II—Clinical Applications in Transfusion Therapy and in Haemolytic Disease of the Newborn.

By D. F. CAPPELL. *Brit. med. J.*, **2**, 641–647, November 2, 1946. 59 refs.

The author discusses the discovery of the immune agglutinins of the Rh system. He suggests the replacement of Wiener's cumbersome terminology by Fisher's neat designations. Fisher suggested that in each individual the Rh phenotype is determined by 3 closely linked pairs of allelomorphic genes—Cc, Dd, Ee. This triple gene complex gives rise to 8 theoretical Rh types, and 7 have been found—Rh_1 (CDe), Rh_2 (cDE), Rh′ (CDe), Rh″ (cdE), Rh_z (CDE), rh (cde), Rh_0 (cDe). The 8 possible types of genes allow of 28 possible genotypes. The products of the triple gene complex should give rise, theoretically, to 6 antibodies, and 5 have been found. It is emphasized that the D antigen is the only really common cause of sensitization, either in intragroup transfusion reactions or in pregnancy. The anti-D-immune serum reacts with 85 per cent of human cells, all of which are Rh-positive (standard Rh serum, anti-Rh_0 serum). Anti-C serum reacts with 70 per cent of all cells and made it possible to designate the Rh′ subtype (anti-Rh′ serum). Anti-E serum reacts with 30 per cent of all cells and permitted the identification of the Rh″ subtype (anti-Rh″ serum). Neither the Rh′ nor the Rh″ subtype reacts with the standard Rh serum. Anti-c serum reacts with Rh-negative cells and detects the Rh-negative factor also in the heterozygous Rh_2 cells anti-Hr St serum). Lately Mourant discovered the anti-e serum. Although Fisher's scheme is very attractive and essentially correct, new work showed it to be oversimplified. Callender, Race and Paykoç found an antibody (anti-Willis) which reacted with a second allelomorph at the Cc locus, called C_w. Almost 50 per cent of anti-C sera react with both C and C_w, whereas the others react only with C. It was also observed that some of the sera may contain 2 or more antibodies of the types described. The author warns against the designation as Rh-positive of persons of the Rh′ and Rh″ subtypes. If such subjects receive a transfusion of Rh-positive blood they may develop the dangerous anti-D antibody. On the other hand, their blood may not be listed as Rh-negative as it may give rise to incompatibility reactions when transfused into patients with anti-c or anti-E antibodies. The author suggests that they should be eliminated from a panel of Rh-negative donors; but regarded as Rh-negative recipients.

The author then proceeds to discuss the "incomplete" or "blocking" antibody. Maternal sera may contain antibodies which interfere with the agglutination of human cells by their appropriate immune-agglutinin, but which do not lead to agglutination by the ordinary methods. Dia-

mond and Abelson determined those incomplete antibodies, however, by suspending the test cells in compatible serum or in 30 per cent serum albumin. Coombs, Mourant, and Race showed that the union of the blocking antibodies with Rh-positive cells could be demonstrated by washing treated cells free from serum and then adding anti-human-globulin serum, when prompt agglutination took place (indirect test). They also showed that cells sensitized *in vivo*, as is the case in haemolytic disease of the newborn, are agglutinated by the anti-human-antibody-globulin serum when washed free from their plasma (direct test). The blocking antibodies may appear in the maternal serum instead of agglutinating antibodies, and may affect the foetus severely. They are considered to be a bad prognostic sign.

. . .

An Rh-negative recipient may become immunized by transfusions of Rh-positive blood. Whereas the first transfusion may be symptomless, further transfusions may be followed by progressively severe symptoms. The administered Rh-positive blood contains the antigens C and/or D and/or E. It is usually the antigen D which is effective. The resulting anti-D antibodies may be accompanied by blocking anti-D antibodies, so that agglutination is only apparent when special tests are carried out (see Part I). In some cases anti-D and anti-C agglutinin may develop. In such instances a blocking anti-D antibody may mask the agglutinating anti-D, so that the serum appears as a homospecific anti-C serum unless the blocking tests are carried out. The antigen E rarely gives rise to antibodies. The author stresses the point that females in or before the reproductive period should receive only blood of Rh type similar to their own. Once sensitization has been established it may give rise to reactions after many years, thus causing haemolytic disease in subsequent pregnancies. The Rh type should be ascertained before each transfusion if time is available. Rh incompatibility is by far the most important cause of foetal death. Haemolytic disease may be expected in about 1 in 250 births. Iso-immunization is more likely to occur where the father is homozygous Rh-positive, but it is not rare with heterozygous fathers.

Results of investigations in 114 cases of haemolytic disease of the newborn are given. Ninety-eight out of 114 mothers were Rh-negative, and 86 out of 98 had antibodies. Sixteen out of 114 mothers were Rh-positive, and only 2 out of 16 had antibodies recognizable by the ordinary saline dilution method. The author believes that some antibodies were missed, as the blocking tests were unknown at the time of the investigations. In only 4 out of 114 mothers was the disease proved in the first pregnancy, and one of those was a dizygotic twin pregnancy. In some families haemolytic disease appeared after 10 or more pregnancies. The author has not encountered a single case where a normal healthy Rh-positive child has been born to an Rh-negative mother after haemolytic disease has occurred in her early offspring. He also records 37 multiparae who had not lost a single child. He admits that we do not yet know why some Rh-negative mothers react so quickly and others more slowly to the Rh antigen. He considers the aptitude to become sensitized to be also an inherited factor. On the other hand, the occurrence of haemolytic disease may be influenced by heterospecific pregnancies. The infant is more likely to be affected when its ABO group is compatible with the mother's. Only 8 out of 90 affected pregnancies were heterospecific, whereas 82 were homospecific. The random distribution should be 18 to 72.

The treatment of haemolytic disease consisted of transfusion at the earliest possible moment: 150 ml. of blood were usually given, either once or twice. Transfusions were carried out slowly. The blood chosen for the infant must not be susceptible to the antibodies present in the mother's serum. In the majority of cases the mother will be Rh-negative and will possess anti-D antibodies. In that event the infant should be transfused with Rh-negative blood, of group O or of the homologous group to the infant's blood.

The paper gives the records of 12 cases of Rh immunization during pregnancy.

Kate Maunsell

154. **Hemolytic Disease Associated with the Rh Factor in Twin Pregnancies.**

By E. A. Conti and J. W. Glenn. *Amer. J. Obstet. Gynec.*, 52, 446–450, September 1946. 11 refs.

The incidence of haemolytic disease of the newborn resulting from the deleterious effect of trans-

mitted maternal antibodies is difficult to determine. The combination of an Rh-negative wife and an Rh-Positive husband occurs once in about thirteen marriages of white people (in America). However, as individuals differ in the ease with which they can " be sensitized ", only about 1 in 25 to 50 Rh-negative persons exposed to the Rh antigen " becomes sensitized ". Occasional occurrences of haemolytic disease when the mother is Rh-positive have been attributed to subtypes of Rh and the Hr factor. Blocking antibodies are probably more significant than agglutinating antibodies of haemolytic disease because they are smaller and hence traverse the placental barrier more easily.

The study of cases of erythroblastosis occurring in twin pregnancies is interesting. Stratton, Langley, and Lister reported the twin pregnancy of an Rh-negative woman; both twins were Rh-positive but of different genotypes. The female was normal, but the male died of haemolytic disease on the fourth day. Aaburg and Roby described a heterozygous pregnancy which presented two varieties of erythroblastosis (icterus gravis and hydrops). Both twins were Rh-positive and the mother was Rh-negative. Thus a difference is shown in the effect on twins of Rh antibodies. Wiener reported a twin pregnancy in which the male twin was Rh-negative and normal and the female died of icterus gravis within 13 hours.

The authors, from a series of 110 multiple pregnancies, report upon 6 twin pregnancies showing evidence of erythroblastosis, 3 in Rh-negative and 3 in Rh-positive women. The first case was in an Rh-negative primigravida; the first child, a normal healthy male, was Rh-negative but the second child, a female, showed a typical picture of hydrops foetalis. The second case was also an Rh-negative primigravida; at full term she had an anaemic Rh-positive male child which survived and at 3½ years was physically normal but mentally about 6 months old. The second twin, also male, was a macerated foetus with oedematous body and shapeless cranium. The third patient, also Rh-negative, had normal heterozygous twins in her first pregnancy, both Rh-positive; 2½ years later she had homozygous twins born prematurely. The first female of the second set of twins had moderate anaemia, but survived and is apparently normal at 3½ years of age. The second child presented the typical features of an icterus gravis, thus again demonstrating the varying response to antibody exposure (or accessibility to the maternal antigens) this time with the more common feature of erythroblastosis—initial sensitization by the first set of Rh-positive twins.

The next 3 cases were in Rh-positive women. The fourth patient had a spontaneous abortion after giving birth to a normal Rh-positive female child. Then homozygous twins were born at 34 weeks. The stillborn female was small with parchment-like yellow skin—foetus papyraceus. The survivor with disproportionately large head and wide fontanelles is physically normal at 18 months but mentally backward. Both were Rh-positive but full serological typing was not possible. The twin pregnancy in Case 5 was preceded by the delivery of a normal Rh-positive foetus 2 years earlier. The second twin, of the reported pregnancy, was a normal Rh-negative male; the other, a male, had a large head and wide fontanelles and died at 11 days after bleeding from mucous membranes for 9 days. Rh determination was not done, but the baby is considered to have been Rh-negative as the pregnancy was monochorial, and the authors believe that the haemorrhagic disease in this case can be explained by the Hr factor. The last case the authors would also explain as due to the operation of an Hr factor—2 normal Rh-positive children preceded twins which were Rh-negative and homozygous; the male survivor (aged 6) was smaller at birth, the larger died at 36 hours from intracranial haemorrhage which is considered to be a manifestation of haemolytic disease.

[It is regretted that the value of this interesting paper is reduced by the limited nature of the serological work which was possible.]

J. F. Heggie

155. **Outlook for Infants receiving Anti-Rh Agglutinins from Iso-immunization of Mothers.**

By A. Bloxsom. *Tex. St. J. Med.*, **42**, 279–281, August 1946. 7 refs.

Rh-positive cells were incubated with various random Rh-negative and Rh-positive sera of the same ABO group. Anti-Rh immune testing serum was then added to incubated cell-serum suspension. It was observed that the agglutinin titre of the immune serum differed according to the serum used for the cell-serum suspension. It was much

lower when certain Rh-negative sera were used for the cell-serum suspensions. The author assumed that those sera contained an anti-Rh reacting factor. He then studied the presence of the anti-Rh reacting factor in 5 sera of Rh-negative mothers and their Rh-positive infants. Infant A was a normal Rh-positive child and the result of a first pregnancy. The mother had a high amount and the infant a low amount of anti-Rh reacting factor. [The stage at which the blood was taken is not mentioned.] Infant B was a fourth child, the third infant having died of erythroblastosis. Seven days before delivery of infant B the mother's blood showed anti-Rh agglutinins and an anti-Rh factor at a titre of 1 in 32. Twelve hours after delivery there were no anti-Rh agglutinins demonstrable but the anti-Rh reacting factor had increased fourfold. Infant B—a normal baby—showed weak anti-Rh agglutinins after delivery and the same titre of anti-Rh reacting factor. Infant C was delivered dead of erythroblastosis. Neither the mother nor the child showed anti-Rh reacting factor. Infant D died of erythroblastosis on the seventh day. Mother and infant had a weak titre of anti-Rh reacting factor. The anti-Rh reacting factor differed from the "blocking antibody" because it occurred also in serum of unsensitized male Rh-negative donors. It was concluded that the anti-Rh reacting factor might be the essential protection against erythroblastosis. The suggestion is made that regular transfusions of serum containing this factor be given to sensitized Rh-negative mothers during gestation.

[The hypothesis of an Rh protecting factor occurring in Rh-negative sera is certainly very attractive. The author, however, does not give details on technique, regarding which a reference is given to Bloxsom and Matthaei, *Amer. J. Dis. Child.*, in the press. Before this paper is available no comment can be made.]

Kate Maunsell

156. **Technique for Determining Rh Factors** (Tecnica per evelare lo "Stato Rh".)

By M. TORTORA. *Arch. Obstet. Ginec.*, **51**, 230–244, July-August 1946. 24 refs.

157. **Some Clinical Aspects of the Rh Factor in Obstetrics.**

By E. L. KING and J. W. DAVENPORT. *Amer. J. Obstet. Gynec.*, **52**, 917–925, December 1946. 20 refs.

158. **Some Aspects of Protein Metabolism in Infants and Children.**

By F. W. CLEMENTS. *Med. J. Aust.*, **2**, 404–409, September 21, 1946. 6 figs., 43 refs.

The amount of protein available for the muscles depends on the demands of certain high priority tissues—red blood cells, liver, intestinal muscles—which have to be met first. If protein intake is poor the skeletal muscles must go short first. If the deficiency is prolonged and severe all tissues will suffer, and the serum protein will fall. Cows' milk contains much more protein than human milk, but the breast-fed baby retains more nitrogen. Occasionally breast milk has a protein content below the average, and the baby will then show poor muscle tone, and, what is more important, a diminished immunity owing to the deficiency in γ globulin. Thus the level of protein reserve in the infant's body should be kept as high as possible.

Artificially-fed infants under 10 months of age must have a relatively higher protein intake than breast-fed children if they are to obtain the same quantity of essential amino-acids. This is provided in the common methods of feeding. If, however, the normal consumption of protein is interfered with in any way, then the supply of protein components in the metabolic pool must be drawn solely from the labile protein of the skeletal muscles. The child's weight then remains stationary or diminishes, the muscles become soft, and the face drawn and bluish. In these cases additional protein is indicated in convalescence, and a mixture (No. 1 protein mixture) of fine casein (90 mesh) and dried skim milk (equal parts) has been used with success (1 tablespoonful contains 6 g. of protein and 2.2 g. of sugar). Half a teaspoonful is given with each normal feed to begin with, and this is increased to 1½ to 2 teaspoonfuls with each of five feeds. Enough water is mixed with the powder to make a fairly thick gruel.

Two cases are described. One infant, a healthy 4-weeks-old breast-fed baby, was fed on glucose and water only for 5 days during his mother's illness, and was then returned to the breast. Although there was plenty of milk it was found on the eighth day that he had lost 18 ounces (510 g.). The child was given 10 to 15 grammes extra protein a day and the weight was regained in a week. The second infant, who was 9 weeks old and weighed 7 pounds 1 ounce (3.2 kg.) had been

fed on various weak milk mixtures. No. 1 protein mixture was given in a 50 per cent milk mixture. The gain in weight and clinical improvement were spectacular, and by the eighteenth week the infant's weight exceeded the average.

Older children receiving 3 meals a day are more liable to suffer from protein deficiency than infants. They require 3 to 4 grammes of protein per kilo per day, or 40 grammes per day for a " toddler." This is provided by: milk, 24 ounces (720 ml.) a day; meat, 1 chop or 1½ ounces (42.8 g.) of chopped steak, or 1½ ounces of fish per day; eggs 4 a week; bread, 1 slice a day; cereals, half a cupful a day; potatoes, 2 tablespoonfuls a day; mixed vegetables 3 tablespoonfuls a day. This standard is often not reached with consequent interference with growth. Many mothers fear to give meat to young children, except brains, which have relatively low protein content. In 25 children there were poor muscle tone and unsatisfactory growth, and an accurate assessment of the diets of 7 of them, aged from 12 to 24 months, showed grave deficiency in protein intake. With thiamine and riboflavin treatment there was no improvement, so a high-protein diet was given by including the following mixture (No. 2 protein mixture): Commercial casein, 60 per cent; dried skim milk, 20 per cent; powdered wheat germ, 10 per cent; maize protein, 10 per cent; One level teaspoonful of this powder contains 7 grammes of protein. One teaspoonful daily was given at first, increased by 1 teaspoonful daily until 4 teaspoonfuls were being taken. It was given with 2 or more ounces (70 ml.) of milk. The mixture was cooked for 1 minute and sugar, tomato juice, and a little salt were added. There was dramatic all-round improvement in 20 of the 25 children with large gains in weight.

Lack of appetite is one of the earliest signs of protein deficiency. Children have a high tolerance for protein, and although, theoretically, there is increased work for the kidneys when much is ingested, it is very doubtful if a high-protein diet has any deleterious effect on these organs in childhood.

J. Vernon Braithwaite

159. **Prevention of Infant Deaths. Liaison between Hospitals and Home Services.**

By J. T. Lewis. *Brit. med. J.*, **2**, 893–985, December 14, 1946. 18 refs.

The author discusses those cases in which infants die soon after they leave the maternity units and hospitals where they were born, and considers how such deaths may be prevented by more effective liaison between the medical and nursing services in the institution and in the home. Seven case histories are described, with comments on the particular factor accounting for death. In each case death was due directly or indirectly to lack of " mothering " and care after the infant left the institution. This home care is more necessary in premature and weakly infants, but is needed also in healthy infants. The ideal solution where home conditions are adverse is the provision of special hostels for mothers and babies or a longer stay in the maternity home. The author discusses the two questions: lack of accommodation and the dangers of cross infection. He states that the alternatives of danger from cross-infection in hospital and the hazard of grossly unsuitable home conditions must be carefully balanced by the hospital doctor and the medical officer of health. But to achieve good liaison the usual notice to the public health department of discharge of the baby, with a short clinical report and a request for an early call by the health visitor, is not enough. He describes a scheme which he has introduced in his area (Barnsley), and which includes the following: (1) The unofficial reporting of pregnancies to the health department by antenatal clinics and domiciliary midwives. (2) Early investigation of the social, economic, and environmental conditions of the families and households concerned. (3) Ascertainment as early in the pregnancy as possible of households needing observation and the maintenance in the public health department of a list of such households. (4) Attempts to ameliorate adverse conditions where found. (5) The checking against the list of all notifications of birth as soon as received. (6) The reporting of home conditions to the hospital doctor immediately after the birth in hospital of a baby to an " observation " household. (7) The reporting to the health department of all admissions to hospitals of babies under 1 year, and, where the infants are from " observation " households, the reporting of home conditions to the hospital doctor. (8) A discussion, when babies from " observation " households are ready for discharge, between the hospital doctor and the medical officer of health, with special reference to the alternatives of hospital cross-infection and

adverse home conditions. This scheme places the onus for initiating liaison on the public health department.

[The part to be played by the family or home doctor in liaison is not mentioned.]

C. McNeil

160. **The Post-Mortem Examination of the Newborn Infant.**

By H. S. Baar. *Brit. med. Bull.*, **4**, 178–188, 1946. 14 figs., 59 refs.

The author does not accept the generally recognized definition of the neonatal period, but extends it to the first 3 months of life. His primary purpose is to describe in great detail the technique of post-mortem examination of the infant. *Pari passu* with this goes an accurate description of almost all the common, and many of the rare and unusual, congenital abnormalities, injuries, and diseases of this period of life. Aetiology and differential diagnoses are described at length, and the importance of accurate bacteriological and histological investigation is stressed.

[This is a lengthy and comprehensive article with an incomplete title. It is not suitable for abstraction, but must be read in the original.]

Jas. M. Smellie

161. **The Pathology of Stillbirth and Neonatal Death. A Review of 1,053 Cases.**

By A. R. Macgregor. *Brit. med. Bull.*, **4**, 174–178, 1946.

The problem of neonatal mortality can only be solved satisfactorily by pathological study. Clinical diagnosis of the cause of death is liable to be inaccurate, and therefore close co-operation between pathologist and clinician is of paramount importance. This review is based on experience as a pathologist to a large maternity hospital, and presents pathological findings in 435 cases of stillbirth, and 618 cases of neonatal death arranged according to the presumed principal cause of death. The majority of cases of stillbirth fall into one of three main categories: defects of development, asphyxia, and intracranial haemorrhage, while in cases of neonatal death a fourth important group is added—infective diseases. These four categories are important, in that they include over 80 per cent of both stillbirths and neonatal deaths, and are dealt with in detail.

Developmental defects of various conditions were found in 20 per cent of the stillbirths and 10.5 of the neonatal deaths. As many of these defects are not preventable their interest is embryological rather than pathological or clinical.

Asphyxia accounted for 37.2 per cent of the stillbirths and 13.1 per cent of the neonatal deaths. Stresses of birth or accidents—ante-partum haemorrhage or prolapse of the cord—are among the most important causes. A considerable quantity of liquor amnii in the lungs is a common finding at necropsy.

Intracranial haemorrhage was responsible for 24.1 per cent of stillbirths and 27.6 per cent of neonatal deaths. Three types are recognizable: subdural, subarachnoid, and intraventricular. A common site of injury is the tentorium cerebelli; a vein in its free margin is often torn and a subdural haematoma results. While the majority of these cases are full-time infants, the proportion in premature infants is high. Subarachnoid haemorrhage is encountered less frequently. Its incidence is greater in premature than in full-time infants, and it is probably due in part at least to venous engorgement of asphyxial origin. It is probably seldom in itself a direct cause of death. Intraventricular haemorrhage is much more serious, and is almost entirely a disease of the premature. Of 156 such cases studied by the author, only 7 occurred in full-time infants. The source of the haemorrhage is usually a vein in the floor of one of the lateral ventricles.

Pathological study has revealed the immense importance of infection as a cause of neonatal death. Out of 241 neonatal deaths occurring after the third day of life 65.5 per cent were due to infection. These infections usually arise in the respiratory or alimentary tract. Pneumonia is the most important and most common. In the first week of life it tends to arise in lungs in which some pathological process has developed following birth stress. In the later neonatal period these infections may be caused by the common pathogens of the respiratory tract, such as organisms of the *E. coli* group or staphylococci. Aspiration pneumonia due to the inhalation either of milk or of regurgitated gastric contents is another form of infection. Of infections of the alimentary tract, gastro-enteritis may be an epidemic disease possibly due to a virus. Thrush infection may also assume a severe and dangerous

form in the new-born baby. Other infections are relatively uncommon. Of the miscellaneous conditions haemolytic disease is the most important, and a brief description of the various pathological types is given.

One fact that emerges clearly from the writer's study is the outstanding importance of prematurity as a factor in foetal and particularly in neonatal mortality. Fifty-four per cent of the stillbirths and 70.5 per cent of the neonatal deaths occurred in cases of premature birth. During the period covered by this series of cases, slightly over 10 per cent of all live births in the hospital were premature, and it was this 10 per cent that produced almost three-quarters of the neonatal mortality. " Nothing could make a greater contribution to a reduction in the neonatal death rate than prevention of premature births."

Jas M. Smellie

162. **Vital Statistics of Stillbirths and Neonatal Deaths.**

By B. WOOLF. *Brit. med. Bull.*, **4**, 170–173, 1946. 9 refs.

By reference to the Decennial Supplement (1931) and the Annual Statistical Reviews (1931 to 1940) of the Registrar-General for England and Wales and the Annual Reports of the Registrar-General for Scotland (1939 to 1943), the author analyzes the stillbirth and neonatal mortality experience of those countries in the years immediately preceding the war.

Approximately half the deaths in the first year of life in England and Wales prior to 1939 were attributable to congenital causes (which in the main occurred during the first 4 weeks of life), resulting in a rate of 30.86 deaths of infants under 1 year of age per 1,000 live births, of which prematurity accounted for 16.83 and malformations 6.02 per 1,000. It is demonstrated that among legitimate infants mortality from prematurity and congenital debility increased as social status became lower; the remaining congenital causes of death showed very little variation between social classes. In the large burghs of Scotland stillbirth rates also increased as the social scale was descended.

In Scotland during the year 1939 to 1943 the mean annual stillbirth rate due to conditions affecting the mother was 10.1, from difficult labour 9.9, from foetal malformations 6.3, and from all other causes 13.3 per 1,000 total births. In Scotland the annual infant mortality rate, assessed on total births, from congenital malformations was also 6.3 per 1,000 during the same period; thus the total wastage due to congenital malformations can be assessed at an annual figure of 12.6 stillbirths or deaths per 1,000 total births.

From data relating to England and Wales for single births only it is demonstrated that within each birth parity group the stillbirth rate increased with increasing age of mother; while within each age group of mother the stillbirth rates were at a maximum for the first child, a minimum for the second, and thereafter increased gradually with increasing birth parity. An analysis of the sex ratio of stillbirths in Scotland (1939 to 1943) revealed a male excess in all cause groups except that of foetal malformations; within this group considerable variation in the sex ratio was observed —a fact also true of infant deaths due to congenital malformations in England and Wales (1931 to 1935).

Attention is drawn to the limitations of (*a*) examining the problem in terms of mortality rather than morbidity, and (*b*) using published statistics in an analysis of this nature, particularly with reference to the examination of the influence of economic and social factors; thus it is not possible to analyze the results, according to social class, of such biological factors as have been mentioned. It would appear that malformations present a somewhat different picture from the other causes of mortality examined, and it is suggested that there is evidence that this type of mortality depends upon intra-uterine environment and not upon gene interactions at fertilization, since it is observed that (*a*) such mortality is high where women are engaged in onerous occupations during pregnancy; (*b*) mortality from congenital malformations and neonatal mortality generally is at an abnormally low level in the area of Greater London; and (*c*) as demonstrated for Scotland (1939 to 1943) the stillbirth rate from foetal malformations shows considerable variation with age of mother. A short discussion of other work on the influence of maternal nutrition and medical care is also included.

A. E. Cheeseman

163. **Milk Embolism in the Lungs as a Cause of Rapid and Unforeseen Death in Infants.** (Sur une cause de mort rapide et imprévue du nourrisson: l'embolie de lait dans le poumon.)
By J. MARIE, P. SERINGE, and S. J. MARIE. *J. Méd. Paris*, **66**, 126, Aug. 1946.

As the result of three post-mortem examinations the authors demonstrate a little-known cause of unforeseen death in infants — namely, milk embolism of the air passages. They describe: (1) The characteristic histological appearance of milk in the bronchi and alveoli (debris stained by Sudan III and curds in the alveoli, appearances which they reproduced in animal experiments). (2) Results of aspiration of milk during life into the lungs (areas of emphysema, and in one case bullae and ruptured alveolar walls). (3) The complications of milk embolism, in one case a fulminating broncho-pneumonia following regurgitation in an infant of 4 (? days). (4) The mechanism of the penetration of milk into the bronchial tree. The prevention and treatment of these accidents are also discussed.

M. Baber

See also No. 102.

MATERNAL WELFARE, MORTALITY

164. **Maternal Welfare and the Negro.**
By P. F. WILLIAMS. *J. Amer. med. Ass.*, **132**, 611–614, Nov. 16, 1946. 8 refs.

165. **Consideration and Analysis of Maternal Mortality.** [In Russian.]
By S. P. VINOGRADOVA. *Pediat. Akush. Ginek.*, No. 4, 19–24, 1946.

This article describes the system of estimating the causes of maternal mortality in the Soviet Union, and the steps taken to improve the maternity services throughout that country. A maternity service may be considered as well run when there is a decrease in maternal mortality and morbidity. Since the establishment of special committees, maternal mortality in the U.S.A. has dropped by 33 per cent. In the U.S.S.R. scientific control of maternal mortality was first introduced in 1938 by Professor Lourier, when a uniform set of obstetric procedures was adopted. Under this system the maternal mortality among 100,000 cases, treated in 50 different maternity hospitals in the Ukraine in 1941, was as low as 0.18 per cent, including a 0.06 per cent mortality due to sepsis. The international classification considers maternal mortality according to the causes of death, and this classification has been provisionally adopted by the Soviet Union (but the author thinks that it might be better to classify maternal mortality under the different types of treatment given and procedures carried out). Maternal mortality is regarded as including all deaths due to pregnancy or childbirth, or taking place during the puerperal period, but only if the pregnancy was one with a viable child. Deaths due to abortions, ectopic gestations, and other abnormalities are not included.

The organization for the study and control of maternal mortality is described as follows: The staff present a full report on each fatal case to a committee composed of specialists, which considers the case and discusses it with the medical personnel concerned. If any error in technique is detected the medical officer and the midwife are taught the correct technique. In addition, the members of the committee are responsible for actual help, when requested, in the diagnosis and treatment of any case (this includes the supply of necessary drugs and blood for transfusion). The method of analyzing maternal mortality is based on accurate certification of the cause of death, together with a detailed history of the case and careful consideration of all factors which may have been responsible for the fatal outcome. Special record is made of the method of antisepsis employed during pre-natal examinations, of the actual treatment of any infection (pharyngitis, rhinitis, pyoderma) of the mother, and of any contact of the expectant mother with infectious illnesses. The aseptic ritual followed during the labour is investigated, especially where there has been manual removal of the placenta; all manipulations, such as insufflation of sulphonamides or blood transfusion are mentioned. Special care is necessary in the analysis of operative deliveries; the length of labour, the qualifications and experience of the surgeon, and any prophylactic therapy—especially if pyrexia was present—must be stated. Importance is attached to early diagnosis of all complications and to full laboratory investigation. Any consultation with a competent specialist and any discrepancy between

the clinical diagnosis and the pathological findings must be specially noted. In deaths from toxaemia the time when the diagnosis was established and the method of treatment are carefully studied. If death occurred from cardiovascular disease, tuberculosis, or any other condition aggravated by pregnancy, the reason why the pregnancy was not terminated is investigated. The author concludes that by thorough and careful pre-natal examinations, by having available skilled personnel and all necessary appliances (such as blood-transfusion apparatus) at a moment's notice, and by the education of both the mother and the medical personnel, maternal mortality in cases in which it can be prevented by proper and timely treatment will be considerably reduced.

Nicholas Tereshchenko

OBSTETRIC OPERATIONS

166. **Prophylactic Intraperitoneal Sulphanilamide in the Surgery of the Infected Obstetric Case.** (La sulfanilamida intraperitoneal profiláctica en la cirugía obstétrica del caso impuro.)

By M. L. Perez and R. Echevarria. *Obstet. Ginec. latino-amer.*, **4**, 477–532, July 31, 1946. 4 figs., 87 refs.

In a review of over 700 Caesarean sections performed on infected cases and taken from the literature of the Argentine and other countries, and from the authors' own cases, it is concluded that the mortality in these cases is greatly reduced by the use of prophylactic sulphanilamide. The mortality in sulphanilamide-treated cases was 0.81 per cent, as compared with 4.3 per cent in controls not receiving sulphanilamide. The mortality in another series of 613 cases of lower-segment transperitoneal section treated prophylactically with sulphonamides was only 0.32 per cent; this compares very favourably with the results of extraperitoneal Caesarean section, where the mortality was 3.33 per cent.

The authors describe the results in 102 Caesarean sections in infected cases and give a detailed case history for each operation as an appendix to their article. There were no deaths from peritonitis, but 5 deaths occurred from other causes—1 from sulphanilamide intoxication, 1 from bronchopneumonia, 1 from a perforated duodenal ulcer, and 2 from transfusion accidents with plasma. The mortality is computed on 96 out of 102 cases, and was thus 5.2 per cent. Using Sureau's classification, 68 out of the 96 cases fell into group II, 21 into group III, and 7 into group IV. In addition to intraperitoneal sulphanilamide, the drug was given directly into the uterus 4 hours after operation. The result was that the concentration in the blood rose to 18 mg. per 100 ml.; morbidity was reduced from 58 per cent with intraperitoneal sulphanilamide alone to 25 per cent. When penicillin was given in addition to intraperitoneal and parenteral sulphanilamide the morbidity fell to 14.2 per cent.

The authors recommend that, for the infected case, lower-segment Caesarean section should be performed with the minimum of trauma and the minimum of peritoneal soiling. Four grammes of sulphanilamide powder should be distributed along the suture line in the uterus, in the peritoneal cavity, and the parietes, with the greater part in the true pelvis. Parenteral sulphanilamide should be given during the 72 hours after the operation, and the level in the blood should be watched and maintained at 6 mg. per 100 ml. Penicillin should be given during or before the operation and maintained after it, 200,000 units being distributed over 48 hours. It is claimed that the problem of Caesarean section for the infected case has been solved.

[The problem of Caesarean section in infected cases is one which has long proved difficult, having been associated with high maternal mortality and morbidity. This article represents an attempt to solve this problem by means of chemotherapy. The chief weakness of the case presented is that no bacteriological studies have been made. The weakness of " blunderbuss " chemotherapy of this kind is that, unless the infecting organism is known, it is impossible to evaluate results. Also, it is known that the modern chemotherapeutic agents are not effective against all known pathogenic bacteria. The colon bacillus found frequently in infections of the genital tract is notably resistant. Doubtless chemotherapy of this kind will do something to lower morbidity and mortality from infection—though the mortality from other causes seems high in this series—but it cannot be agreed that the problem is solved.]

Josephine Barnes

167. **The Extraperitoneal Caesarean Section.**
By P. H. OOSTERHAGEN. *S. Afr. med. J.*, **20**, 712–713, Nov. 23rd, 1946. 10 refs.

168. **A New Modification of the Technique of the Caesarean Section.** [In English.]
By A. M. RITALA. *Acta obstet. gynec. scand.*, **26**, 604–609, 1946. 8 figs., 13 refs.
See also No. 133.

GYNAECOLOGY

169. **Low Back Pain in Women.** (Die Kreuzscherzen der Frau.)
By J. WEGLEITER. *Wien. klin. Wschr.*, **58**, 649–652, Oct. 25, 1946.

170. **Psychosomatic Gynecology.**
By J. P. PRATT. *J. med. Ass. Georgia*, **35**, 243–256, Sept., 1946. 8 refs.

In this article Pratt affirms his belief in the importance of the psychosomatic element in the diseases of women. He illustrates this by references to cases seen in his own practice. The woman who blames an operation for the symptoms produced by the death of an intimate friend is given as an example. He stresses the need for kindly talks before operation as a means of diminishing operation fears, and cites the case of a woman who feared an anaesthetic because she had the worry of an earlier abortion on her mind. He describes a case of dysmenorrhoea caused by anxiety over masturbation, and a similar one produced by the psychic trauma of overhearing a maid having intercourse and later being threatened with murder by the maid if she mentioned it. Again he points out that symptoms are often attributed to the menopause which are really the result of the emptiness and aimlessness of life consequent upon the growing up and leaving home of a woman's children. He deals with all these difficulties in a superficial way, but no doubt his insight and kindly approach are very helpful to those who do not need deeper psychological exploration.

Clifford Allen

Menstrual Disorders

171. **Menstrual Disorders. Some Aspects of Sex Endocrinology in General Practice.**
By E. C. HAMBLEN. *North Carolina med. J.*, **7**, 533–539, Oct. 1946.

172. **Inactivation of Oestrogens by the Human Liver.** [In English.]
By A. WESTMAN. *Gynaecologia, Basel*, **122**, 220–223, Oct. 1946. 2 figs., 6 refs.

After reviewing briefly the literature concerning the inactivation of oestrogens by the liver of animals, the author describes an attempt to treat metropathia haemorrhagica by conducting venous blood from the ovaries to the liver. Six cases were operated on, flaps of omentum or mesentery being embedded in longitudinal incisions in the ovarian cortex and fixed to the ovaries by sutures. In 2 cases the result was good and regular menstruation was restored, but the possibility of spontaneous regression cannot be excluded. There was no improvement in the other 4 cases and finally a hysterectomy was done. At this second laparotomy it was found that in 2 cases the omental flaps had not become adherent to the ovaries. It is noted that in the 2 cases in which the omental flaps were firmly adherent to the ovaries the urinary oestrogenic output was diminished, while in the 2 cases in which the omental flaps had become loosened the urinary oestrogenic output was not diminished. The author concludes that, although the operation is probably of no value from the therapeutic point of view, it provides evidence that the human liver does inactivate oestrogens.

Nicholas Tereshchenko

173. **Studies on the Ovary and the Endometrium in Menstrual Anomalies.** (Estudios sobre el ovario, el endometrio y las anomalías menstruales.)
By P. A. GOMEZ HERRERA and J. M. BEDOYA GONZALEZ. *Rev. esp. Obstet. Ginec*, **5**, 71–79, Aug. 1946. 7 figs.

Anatomical changes in the ovary were studied in relation to different states of the endometrium in 98 cases. Changes in the endometrium were classified as follows:

I. Phase of complete secretion.
II. Phase of incomplete secretion.
III. Secretory phase in hypertrophic endometrium.

IV. (*a*) Simple proliferation.
(*b*) Proliferation with moderate hyperplasia.
(*c*) Proliferation with marked hyperplasia.
(*d*) Atrophic endometrium.

In all cases in Group I luteal tissue was found in the ovary, explaining the secretory state of the endometrium. In 5 cases a normal corpus luteum was found. In the others there were abnormal corpora lutea, but sufficient progesterone had been produced to cause the secretory phase. In 1 case a haemorrhage luteal cyst the size of a tangerine was present. Various other abnormalities were found, including 5 cases where the ovaries contained follicular cysts. It is concluded that it is possible for the cycle to continue in spite of the existence of follicular cysts and that progesterone secretion persists in haemorrhagic corpora lutea.

In Group II there was always a recent corpus luteum, but in 2 cases the corpus luteum was haemorrhagic. Since complete secretory change can take place with haemorrhagic corpora lutea, secretion of progesterone must have been deficient in these cases. In 1 case the corpus luteum had regressed; in 2 cases, luteinization had taken place in a follicular cyst.

Three cases occurred in Group III. Follicular cysts were found in all, but in each there was also a normal corpus luteum, thus showing that a normal follicle had ruptured, in addition to the follicular cysts, and had caused secretory change in an already hypertrophic endometrium. In 12 out of the 36 cases in Group IV (*a*) normal follicles in process of maturation were found. In others follicular cysts were demonstrated and in 1 a corpus luteum haematoma. In some these were no cystic or maturing follicles, only many atresic follicles, some cystic corpora albicantia, masses of theca cells, and primordial follicles. It is clear that these structures can form oestrogen in sufficient quantities to cause proliferation of the endometrium; this supports the idea that theca-lutein cells produce oestrogens. In Group IV (*b*), in 20 out of 26 cases normal follicles with a few follicular cysts were found. In others corpus luteum haematomata or regressive corpora lutea were present. In 1 case in Group IV (*c*) there was a theca-cell tumour. Small cystic ovaries were found in the majority of cases, but some cases showed masses of theca cells and others showed luteinization, thus demonstrating that endometrial hyperplasia and lutein tissue can coexist. Of the 2 cases in Group IV (*d*), 1 had small cystic ovaries and the other had abundant atresic follicles. It may be that the ovaries produced no oestrogens or that the endometrium was incapable of reacting.

[The subject of menstrual abnormalities remains something of a mystery. It is interesting to find luteal and theca-luteal tissue demonstrated in the ovaries of women with abnormal endometrium. This suggests that ideas on the function of the corpus luteum need revision.]

Josephine Barnes

174. **A Case of Acquired Haematocolpos in Adolescence due to Trauma in Early Childhood.**
By M. M. KENNEDY. *Med. J. Aust.*, **2**, 634–635, Nov. 2, 1946. 5 refs.

A girl of 16 attended with a suprapubic swelling. She had never menstruated and the vagina was found to be completely obstructed ¾ in. (2 cm.) above the hymen by a firm membrane. When this was incised 3½ pints (2 litres) of thick dark blood escaped. After repeated dilatation and a plastic operation a vagina of normal lumen was obtained. Subsequently menstruation started normally. There was a history of a fairly severe perineal injury at the age of 5 years, the child falling astride a chair rung, which was said to have penetrated deeply into the vagina. Several sutures were inserted in hospital.

Whether this was an acquired or congenital haematocolpos was not certain. Cases presenting at this age are nearly all of congenital origin. The lumen of the vagina fails to develop completely, and when menstruation starts blood collects above the obstruction. There is often associated genital hypoplasia. The uterus in this case was of normal adult size but the secondary sex characteristics were immature. The acquired form of haematocolpos usually results from senile vaginitis, the vaginal walls becoming adherent following denudation of their epithelium. Since the patients are past the menopause, symptoms arise only when pathological haemorrhage occurs—for example, from fibrosis uteri or carcinoma. Vaginitis in childhood is an occasional cause of the acquired form. The author has not been able to find a recorded

case due to injury. He gives his reasons for believing that this was an acquired haematocolpos due to trauma.

H. J. Croot

175. **Menorrheal Problems in College Women.**
By N. WINTHER. *Amer. J. Obstet. Gynec.*, **52**, 803–809, Nov. 1946. 3 refs.

176. **Intermenstrual Pain.** [In English.]
By A. WESTMAN. *Gynaecologia, Basel*, **122**, 216–219, Oct. 1946. 4 refs.

177. **Pituitary and Ovarian Dysharmony.** (Le syndrome de dysharmonie hypophyso-ovarienne.)
By M. ALBEAUX-FERNET. *Méd. français, Paris*, **6**, 371–374, Dec. 25, 1946.

178. **A Patient with Severe and Prolonged Functional Uterine Haemorrhages.** (Een patiënte met sterke en langdurige functioneele uterusbloedingen.)
By M. A. VAN BOUWDIJK BASTIAANSE. *Ned. Tijdschr. Geneesk.*, **91**, 54–60, Jan. 11, 1947.

179. **A Psychosomatic Evaluation of the Psychiatric and Endocrinological Factors in the Menopause.**
By M. H. GREENHILL. *South. med. J.*, **93**, 786–793, Oct. 1946. 9 refs.

This paper was read before the Section on Neurology and Psychiatry of the Southern Medical Association, and it is concerned chiefly with the subject of the menopause from the point of view of the psychiatrist. The author dislikes the name "menopause syndrome"—a term which, as generally defined, implies the presence of a psychiatric disorder. He objects to the term because of the many misconceptions associated with it, the chief of which is the belief that, if psychiatric symptoms are discovered in a woman at the time of the menopause, these are directly and primarily related to the menopause. This belief is still widely held; the author produces evidence to show that where psychiatric disorders accompany the menopause careful investigation will almost always yield a history of the previous occurrence of such a condition.

As regards the psychoneuroses the evidence tends to show that these never begin with the menopause. Any woman who has symptoms of an anxiety neurosis, hysteria, phobic state, compulsive-obsessive neurosis, or hypochondriasis in the menopause has had the condition in her earlier years. In some cases the psycho-neurosis continues through the menopausal period without significant change. In others there is an accentuation of symptoms; the whole concept of the menopause and all that it means may cause psychoneurotic problems to become acute. It may happen that for many years before the menopause the woman has been in excellent health so that it might be supposed that the psychoneurosis had come into being at the time of the climacteric. In most cases, however, investigation will reveal a history of a psychoneurosis and that a period of remission has been experienced.

Involutional melancholia, characterized by depression, agitation, and paranoid ideas, may be an exception and may originate at the time of the menopause. It is not denied that most women have at least mild feelings of anxiety about undergoing the climacteric. The healthy woman, however, who has no background of psychological disorder will generally overcome her depression doubts and fears without much difficulty.

Oestrogens are seldom effective in the treatment of the "menopausal syndrome". They have little or no effect on psychoneurotic disorders, and they are to be recommended only in those instances in which autonomic symptoms (tremors, dilated pupils, pallor, or flushing) have existed before the menopause and have been accentuated by it.

T. C. Clare

180. **Hormone Therapy of Postmenopausal Complaints.** (Hormonale Therapie postklimakterischer Beschwerden.)
By A. SAURER. *Schweiz. med. Wschr.*, **76**, 1198–1201, November 23, 1946. 2 figs.

See also No. 98.

Sterility.

181. **Childlessness and the Small Family. A Fertility Survey in Luton.**
By R. M. TITMUS and F. GRUNDY. *Lancet*, **2**, 687–690, November 9, 1946. 3 refs.

In 1945 a social survey was launched in the borough of Luton, which has a population of about 101,000. A report of this survey, with a full description of the method and operation, has appeared as *A Report on Luton* (Luton: Gibbs and Bam-

forth). This paper gives an analysis of the information obtained by the survey in so far as it concerned fertility. Information was obtained from samples totalling 3,803 married women, and some of the material collected is submitted in the form of tables and analyzed in the present paper. Four main tables are submitted, as follows:

Table I.—Percentage of married women who have not borne at least 1 live child (classified by duration of marriage and in age groups).

Table II.—Percentage of wives aged under 45 having at least 1 or 2 children within the first 5 years of marriage (classified by duration of marriage and in age groups).

Table III.—Distribution of live-born children to wives aged under 45 after a marriage duration of 10 to 15 years.

Table IV.—Size of families. Relative frequency of families of different sizes born to wives married at the age of 20 to 25.

To supplement the survey an analysis was made of the histories of pregnancy of all married women who bore a live child during 1945, a total of 1,961 women being concerned.

In their summary and conclusion the authors make it clear that it would be wrong to assume that what is true of Luton is also true of the rest of the country, because Luton has its own peculiar problems of population and industry. The summary, as given by the authors, of the "more notable biological facts" reported is as follows: (1) There is no evidence of any increase in the proportion of childless marriages over three generations, and (given the same age at marriage) no marked social class differences. (2) The degree of control over childbearing within marriage, hitherto exercised by women marrying in the late twenties and early thirties, is now in process of being adopted by those marrying in earlier ages. (3) For many wives there is now a long interval of time between marriage and the first pregnancy, and between the first and subsequent pregnancies. (4) Only a small proportion—less than 2 per cent—of all wives can now be described as continuously childbearing. (5) A large increase has been noted in the proportion of one-child and two-child families in recent years, and a dramatic fall in the proportion of families containing 5 or more children. (6) The trend towards a smaller family size continued during the war—despite a rise in the birth and reproduction rate.

R. H. Parry.

182. **Simplified Management of Relative Sterility.** By R. TORPIN. *J. med. Ass. Georgia*, **35**, 285–288, October 1946. 28 refs.

The author says the subject of sterility is often made so complicated by experts that the general practitioner thinks it is out of his province. This is a great pity, because much valuable work can be done by the practitioner, and the object of this article is to draw attention to simple procedures which are of value. The tubal patency test may conveniently be omitted, as it is of doubtful therapeautic value, and it is usually possible by clinical examination to judge whether the Fallopian tubes are likely to be patent or not. In any case, if the tubes are found to be blocked it is doubtful whether surgical procedures are advisable, as these are so seldom successful. The Huhner test, in which post-coital fluid is taken from the cervix, and upper vagina and examined under the microscope, is of value. It is possible with the naked eye—after a little experience—to judge whether the spermatozoa are normal or not. If the spermatozoa are dead or show little motility the test should be repeated after a pre-coital douche with 2.5 per cent solution of bicarbonate of soda. If the spermatozoa are still dead then the patient should be referred to a urologist. A cervical erosion is a common cause of sterility and may be effectively treated by electric cauterization. It is important to determine the time of ovulation so that advice can be given about the fertile period, and also to know that ovulation is occurring. This may be determined either by a daily temperature recording or by an endometrial biopsy. Any malposition of the uterus, such as retroversion, should be corrected and a pessary inserted. Foci of infection, anaemia, and lowered metabolism should be dealt with in both husband and wife. Thyroid extract is often advisable, also a high protein diet. The author also recommends the use of a 2.5 per cent sodium bicarbonate douche to which corn syrup 1.2 per cent may be added with advantage.

L. W. Lauste

183. **The Problem of Sterility Today.**
By M. E. DAVIS. *Amer. Practit., Phila.*, **1**, 1–14, September 1946. 20 figs.

184. **Male Infertility.**
By R. J. DOUGLAS. *Urol. cutan. Rev.*, **50**, 529–531, September 1946. 9 refs.

The male is responsible for barren marriages in 20 per cent to 50 per cent of cases. General male debility due to tuberculosis, nephritis, diabetes mellitus, and syphilis may coexist with marked fertility, while many infertile males give no evidence of ill health. Local conditions are important, such as bilateral epididymitis, urethral stricture, hypospadias, pin-point meatus, bilateral vasectomy, prostatectomy, perurethral bladder-neck resection, old trauma, testicular tuberculosis or atrophy, and bilateral cryptorchidism. Contributory causes include an infantile penis, male impotence, and premature ejaculation.

Semen examination is essential. The condom method is responsible for many errors, and a sterile glass container is the most satisfactory method of collecting the specimen. The normal volume of ejaculate is from 2.5 to 6 ml., 3 ml. being the average and 70,000,000 spermatozoa per ml. the accepted standard. However, Hotchkiss found that 25 per cent of fertile males had a count below 20,000,000, and fertility has been reported with much lower counts. Spermatozoal morphology is very important. When the percentages of abnormal forms is 25 or more infertility is the rule. Clumping of spermatozoa is also usually associated with infertility. Spermatozoal virility is important. Where activity is little impaired after 12 hours marked virility is indicated, and vice versa.

Whereas the use of testosterone in infertility has usually been considered to be contra-indicated, the authors conclude that it is of benefit, being of greatest value in subfertility, especially with normal sperm count but a lack of spermatozoal vigour. Testosterone may be of use in aspermia, and is frequently helpful in coital failure.

Alex E. Roche

185. **Sterility in Males.** (De steriliteit van den man.)
By L. I. SWAAB. *Ned. Tijdschr. Geneesk.*, **90**, 1796–1808, November 30, 1946. 72 refs.

Abnormalities of the Reproductive Organs

186. **Absence of Vagina and Uterus.**
By H. A. RIDLER. *Med. J. Aust.*, **2**, 774, November 30, 1946.

187. **Vesico-Vaginal Fistula.**
By D. M. SATUR. *J. Obstet. Gynaec., Lahore*, **7**, 141–149, September 1946.

Infections of the Reproductive Organs.

188. **A Case of Acute Generalized Gonococcal Peritonitis.** (A propos d'un cas de péritonite aiguë généralisée à gonocoques.)
By R. GUENIN. *Gynaecologia, Basel*, **122**, 224–232, October 1946. 18 refs.

The literature on generalized gonococcal peritonitis (as opposed to a localized inflammation of the pelvic peritoneum) is reviewed. The disease appears to be more frequent in children than in adults; there is, as a rule, no definite evidence of gonorrhoea on simple inspection; the gonococcus invades the peritoneal cavity either through the ostium of the Fallopian tube or by direct spread through the tubal wall. The clinical picture is that of an acute abdominal condition and a correct diagnosis cannot be made unless a vaginal examination is carried out: this will be painful if the peritonitis is gonococcal in origin and painless in the other conditions which give rise to a generalized peritonitis. The prognosis is good. The treatment is laparotomy with drainage and chemotherapy. One illustrative case is described.

Nicholas Tereshchenko

189. **Pelvic Inflammatory Disease. A Survey of 300 Consecutive Cases, with Special Reference to Treatment.**
By J. E. TRITSCH, I. H. SAXE, and E. SCHNEIDER. *New Engl. J. Med.*, **235**, 414–416, September 19, 1946. 5 refs.

Sulphonamides are now established in the treatment of infective conditions. The authors, however, doubt their value for pelvic inflammatory disease and quote others in support of this view. A consecutive series of 297 cases was taken, all with inflammatory disease of the pelvis severe enough to need hospital treatment, some patients being

desperately ill, while 2 died. The age distribution was as follows: 56 per cent were under 25; 30 per cent between 25 and 35; and 14 per cent over 35. All were kept in bed. One group was treated by rest alone, another by rest and sulphanilamide or sulphadiazine, and a third by surgery. The chief complaints were of pelvic pain and vaginal discharge. Operation was performed if pelvic masses persisted.

Improvement was obtained by rest alone in 91 per cent of cases, compared with 89 per cent treated with sulphonamides. Cure resulted in 6 per cent with rest alone and in 6 per cent with rest and sulphonamides. With operation, cure was obtained in 37 per cent, while 63 per cent were improved. The total incidence of surgical intervention was 14 per cent and was progressively lower in the younger age group.

[In the present furore for chemotherapy it is good to see a controlled investigation of this kind. This series is, however, not large; no account is taken of the cause or type of pelvic inflammatory disease, nor is there any mention of how long cases were followed up.]

Josephine Barnes

190. **The Ovary in Salpingitis.** (Estudios sobre el ovario anexítico.)

By A. Sopena Ibanez and P. Botella Llusia. *Rev. esp. Obstet. Ginec.*, **5**, 84–89, August 1946, 8 figs., 5 refs.

Fifty-five ovaries removed from patients with pelvic inflammatory disease were studied macroscopically and microscopically to determine the effect of inflammatory lesions on the ovary and the functional alterations which occur in these cases. It is found that the ovary becomes infected in cases of salpingitis and this infection tends to recurrence and reinfection. Eventually a functional reaction takes place in the ovary. In 62 per cent of the ovaries follicular cysts were present. This was found to lead to anovular menstruation in a high proportion of cases. There was a general tendency to increase the oestrogenic secretion, and this tended to lead to hyperplasia of the endometrium and thus to menorrhagia, metrorrhagia, and polymenorrhoea.

[It is well known that cases of chronic pelvic infection tend to have menstrual disturbances, and this is believed to be due to infection of ovarian tissue, causing functional disturbance of the cycle. This article demonstrates the mechanism of production of these disturbances of function.]

Josephine Barnes

191. **Acute Salpingitis due to Friedlander's Bacillus. Report of a Case.**

By T. W. Botsford and T. D. Kinney. *New Engl. J. Med.*, **235**, 539–541, October 10, 1946. 2 figs., 11 refs.

New Growths of the Reproductive Organs.

192. **The Difficulties of Early Diagnosis of Malignant Tumours of the Female Genital Organs.** (Ueber die Schwierigkeiten bei der Früherkennung maligner Tumoren des weiblichen Genitale.)

By T. Rust. *Gynaecologia, Basel*, **122**, 169–184, September 1946.

The difficulties of early diagnosis of malignant tumours of the genital organs in women are discussed and the history of attempts to make the diagnosis sooner is traced. The early symptoms of ovarian carcinoma are described and it is emphasized that abdominal symptoms in a woman should always lead to a gynaecological investigation. In uterine carcinoma the common early symptom is irregular haemorrhage. In all cases a speculum should be passed to inspect the portio vaginalis of the cervix. Colposcopy, introduced by Hinselmann, may be useful. Schiller's iodine test is described and the various findings are tabulated. In cases where the tissues do not stain, or stain inadequately with iodine, a biopsy should be done. Palpation of the internal genital organs should also be carefully carried out, but changes will be found only in advanced cases. The author tabulates the lines of investigation to be followed to exclude early malignant disease. The history of the menstrual cycle and of irregular haemorrhage must be fully investigated. Biopsy of the cervix should be carried out when a raised plaque is found or if an erosion does not respond to treatment. Curettage should be performed in every case of abnormal bleeding, in cases of irregular bleeding in the premenopausal period, and in all cases of post-menopausal bleeding. The diagnostic procedures should be repeated when, in spite of negative histological

evidence, the case remains suspect. Control and follow-up of the patient are essential. All women admitted to hospital should have a gynaecological examination and investigation.

[This paper contains much sound sense and if its recommendations are universally carried out, many tragedies due to late diagnosis of female genital carcinomata would be averted.]

Josephine Barnes

193. **Retroperitoneal Tumours Simulating Genital Tract Neoplasms.**

By W. B. STROMME and H. J. STANDER. *Amer. J. Obstet. Gynec.*, **52**, 456–463, September 1946. 5 figs., 12 refs.

Retroperitoneal tumours are rare, difficult to diagnose pre-operatively, and usually mistaken for ovarian or uterine tumours. Tumours of the mesentery and retro-peritoneal tumours are believed by many to arise in the mesenchyme surrounding the primitive coelomic cavity. They may be cystic or solid, benign or malignant. They are derived from: (1) retroperitoneal organs and their "anlagen"; or (2) retroperitoneal connective tissue. A classification is proposed. In 12 years in the Women's Clinic of the New York Hospital retroperitoneal tumour was encountered 12 times in 13,113 gynaecological operations. Details are shown in a table. The diagnosis was made pre-operatively 4 times. Two were cases of retroperitoneal cyst of the Wolffian duct, while 1 was a dermoid cyst, 1 a lipoma, 2 fibromata, 1 a fibrosarcoma, 1 a cystadenoma, 1 an adenocarcinoma and 1 a neurilemmoma. The remaining 2 tumours originated in a tuberculous kidney and a hydronephrotic kidney respectively.

One case is described in detail. A married woman, aged 57, had noticed some abdominal swelling since the birth of her last child 17 years earlier. Three years before her admission to hospital she refused operation on her tumour. So large did it become that she was bedridden for 18 months before consenting to hospital treatment. She had few complaints other than those relevant to the size and weight of the tumour: There was no post-menopausal bleeding. A huge abdominal tumour was present. It gave no fluid thrill. The overlying skin was eroded and infected. The cervix was healthy. For 3 months she rested in hospital receiving skin medication, blood transfusion, and vitamin therapy. At operation, the pelvic organs with normal bowel were found displaced by a large retroperitoneal tumour extending from the pelvic floor to the diaphragm, and originating in the left abdominal sulcus region. Its overlying peritoneum was entered and the tumour was gradually mobilized by sharp and blunt dissection until it was finally removed. Sulphanilamide (6 g.) was sprinkled in the retroperitoneal space and peritoneal cavity. The operation took 4 hours during which the patient received 1,900 ml. of blood. Her condition did not permit of removal of the excess of abdominal wall, which was closed in layers. A stormy post-operative course followed. The abdominal wall healed by secondary intention. A ventral hernia was repaired 3 months later. The patient was in good health when last seen 2 years and 4 months after operation. The tumour when examined measured 13 × 48 × 58 cm. and weighed 59 pounds (27 kg.) There was no macroscopical or microscopical suggestion of malignancy. Histologically it was a myxofibroma.

Valuable in diagnosis of these tumours is the relative fixation of the tumour on abdominal and pelvic examination. Ascites is absent. History is important only in the exclusion of primary pathology of the lower bowel and uterus. The possibility of retroperitoneal tumour must be kept constantly in mind. If it is suspected, intravenous pyelography may help in showing: (1) disturbance or absence of function when the tumour is of renal origin; and (2) a wide displacement of the ureter, and occasionally also of kidney, by the neighbouring retroperitoneal tumour.

Anthony W. Purdie

194. **Treatment of Cancer of the Vulva with Special Reference to Combined Electrosurgical and Radiological Treatment.** (Zur Therapie des Vulvarcarcinomes, mit besonderer Berückischtigung der kombinierten elektrochirurgischen und radiologischen Behandlung (Methode von Berven.))

By J. H. MULLER. *Gynaecologia, Basel*, **122**, 193–215, October 1946. 7 figs., 22 refs.

Carcinoma of the vulva is a disease of old age. It is frequently associated with leukoplakia, kraurosis, and other chronic changes in the vulva, and

is often in an advanced stage by the time the patient seeks treatment. Follow-up of the cases shows that radical treatment of the vulva and of the associated lymphatics is necessary to obtain cure. Local excision is followed by recurrence in a relatively short time. In the majority of cases the growth has ulcerated on the surface and is infected when the patient comes for treatment, which may be surgical, radiological, or a combination of both. In surgical treatment there is an immediate operative mortality of 10 to 15 per cent and a permanent cure rate of 2 to 25 per cent (Taussig reports a cure rate of 58.5 per cent.) The treatment consists of excision of the vulva and bilateral removal of lymph nodes *en bloc* combined with intraperitoneal and extraperitoneal excision of the iliac nodes.

The permanent cure rate of radiological treatment is 12 per cent (Stoeckel). Irradiation of the primary tumour leads to retrogression but often a necrotic area appears on the vulva and later a definite secondary tumour. The permanent cure rate of combined treatment is 29 per cent (Cahen). Cahen treated primary growths by radium needles and the region of the lymph nodes with radium plaques and later performed total vulvectomy with radical excision of the inguinal and iliac nodes on both sides. Later Berven combined electrosurgical excision of the vulva with irradiation of the lymph nodes. His immediate operative mortality was 6 per cent. Since 1929 irradiation has been given by teleradium (3 to 5 g. radium bomb). Surgical excision has been carried out after irradiation if the inguinal glands were enlarged and the general condition of the patient permitted. Berven has treated 177 cases with good results.

During the years 1918–45, 40 cases of carcinoma of the vulva have been treated in the Zürich Clinic, some by operative measures alone, some by irradiation alone and all since 1930 by the combined treatment. Since 1940 the author has treated 10 cases by electro-surgical excision of the vulva and radiotherapy of the lymph nodes. If the primary tumour is large it is irradiated first, as thereby the risk of post-operative complications is reduced. The author uses electrodes of 0.5 to 2 cm. thickness and a diathermy apparatus with a current of 4 to 8 amperes. He has modified Berven's technique slightly. After electro-surgical excision of the outer vulval area he inserts a silk thread through each half of the vulva to be excised, and by traction on the threads is able to expose and to get better access to the inner parts of the vulva. Similarly by insertion of a silk thread in the neighbourhood of the clitoris, he obtains better access to the deeper area in this neighbourhood. There was no post-operative mortality in the 10 cases, though 3 of the patients were over 75. The healing of the wound was satisfactory, but more prolonged in those cases which had had previous X-ray therapy. The irradiation technique consists of fractionated irradiation from 1,000 to 4,000 r (surface dose) to large primary tumours before electro-surgical excision; 3,000 to 4,000 r is applied to both inguinal regions and 1,500 to 2,500 r to exactly symmetrical posterior fields. The field size is 10 × 10 cm. or more; the focal skin distance is 50 to 80 cm. The voltage is 180 kV.; filter 0.5 mm. to 0.85 mm. copper, +2 mm. aluminium; average daily dose 200 r.

Not all the cases receiving this treatment have been followed up for 5 years, so that no statistics can be given. It is interesting to note, however, that with one exception there has been no recurrence, although the follow-up has been from 1½ to 5½ years, and it is well known that recurrence and metastases usually reveal themselves within the first year. These results are definitely superior to those obtained by other therapeutic procedures as shown by the following summary of the 50 cases treated in Zürich since 1918: (1) Operative treatment only—3 cases; 1 patient died of carcinoma, 1 of intercurrent disease, and 1 was alive after 5 years. (2) Irradiation treatment only—7 cases; the 7 patients died of carcinoma. (3) Combined operative and irradiation treatment—15 cases; 11 patients died of carcinoma, 1 of intercurrent disease, 3 were alive after 5 years. (4) Combined electro-surgical and irradiation treatment: (*a*) 1930–1931, 5 cases; 2 patients died of carcinoma, 1 of intercurrent disease, 2 were alive after 5 years; (*b*) 1940–1945; 10 cases; 1 patient died of carcinoma, 1 of intercurrent disease, 8 were alive after 1½ to 5½ years—average 3 years.

G. Dodds

195. The Early Diagnosis of Carcinoma of the Cervix.

By B. D. Best. *Manitoba med. Rev.*, 27, 14–15, January 1947.

196. **The Diagnosis and Treatment of Carcinoma of the Body of the Uterus.**

By S. G. MOCATTA. *Med. Press*, **216**, 396–399, November 27, 1946.

197. **Endometriosis: A Surgical Problem.**

By D. MACLEOD. *Brit. J. Surg.*, **34**, 109–116, October 1946. 10 figs., 57 refs.

This is a discussion of that condition in which areas of tissue indistinguishable from uterine mucosa are found in abnormal situations. Such tissue is subject to the cyclical changes induced by active ovarian secretion, but the products of "menstruation" have no outlet and may form tumours or cysts. Endometriomata only occur during the childbearing period of life and disappear after the menopause, whether natural or induced. A discussion of the way in which the mucosa becomes ectopic deals with the possibilities of direct invasion, implantation of cells "spilt" out of the Fallopian tube, metaplasia of serosal epithelium (or even of ovarian follicular epithelium), and lymphatic spread. The conclusion reached is "that endometriomata wherever they occur are the result of the endometrium taking upon itself lymphatic permeation."

The sites in which endometriomata develop are enumerated. The commonest place is the ovary, where chocolate or tarry cysts are often found. Other sites are the peritoneum of the pouch of Douglas, the vaginal vault, the recto-vaginal septum, the perineum, the round ligament (even that part in the groin), the umbilicus, the bladder, a laparotomy scar, the small and large bowel, and, very rarely, the ureter. When the small bowel is affected, the pain, vomiting, distension, and constipation may simulate either appendicitis or intestinal obstruction; sigmoid endometriosis may easily give rise to suspicion of obstruction by a carcinoma, and very occasionally blood is passed per rectum at the menstrual time. Even at operation endometriosis of either small or large intestine may closely resemble malignant disease. The history of attacks of pain coinciding with the menstrual periods may help to differentiate. When the bladder is involved there are cyclical crises of frequency of micturition, dysuria, suprapubic pain, and sometimes haematuria. It is pointed out that in women of about 40 treatment by removal of the ovaries or castration by irradiation is fully justified. In younger women this drastic procedure is only to be considered in extreme cases, for example, when otherwise a removal of the rectum might be necessary. Usually local removal of the affected part should be recommended. The author concludes with an interesting epilogue in which he shows that an endometrioma occupies a pathological position midway between a simple and a malignant growth. Though it is an alien tissue in the part where it grows, it is still under the functional control of the ovary. His last sentence is worth special attention: "Is it too much to hope that further study and research in this problem will bring with it the key to the essential nature of malignancy itself?"

[The article is well illustrated by coloured pictures and deserves the attention of all those interested in surgery of the abdomen.]

Zachary Cope

198. **Ectopic Endometrial Tissue in the Thigh.**

By C. P. SCHLICKE. *J. Amer. med. Ass.*, **132**, 445–446, October 26, 1946. 3 figs., 2 refs.

The occurrence of a small tumour containing endometrial tissue in the thigh of a Filipino woman is recorded. The patient, aged 35, married, with 5 children and a normal menstrual history, complained that for 3 years she had suffered from a tender lump on the posterior aspect of the left thigh. The lump had steadily increased in size, but was always more swollen and painful during menstruation. Beyond the presence of a deep seated, hard, tender tumour about the size of a golf ball and a handbreadth below the left gluteal fold, nothing of note was found on physical examination.

At operation, the tumour was found to be stony hard, about 4 cm. in diameter, situated in the deep fascia, and intimately adherent to surrounding structures. It was excised together with a cuff of fascia and fatty tissue. Convalescence was uneventful. On section, the cut surface was seen to be grey and speckled with small brown spots. Microscopical examination showed numerous glandular acini containing blood cells and débris lined with epithelium. The glands and the surrounding stroma resembled those of functioning

endometrium. The presence of heterotopic endometrial tissue in such a location is probably best explained by the entry of endometrial fragments into the blood stream. The variations in the tumour with menstruation suggest a response to endocrine stimulation.

S. S. B. Gilder

199. **Endometriosis. Two Hundred Cases Considered from the Viewpoint of the Practitioner.**

By J. FALLON, J. T. BROSNAN and W. G. MORAN. *New Engl. J. Med.*, **235**, 669–673, November 1946. 3 figs., 12 refs.

200. **Cystic Adenomyosis of the Uterus.**

By S. GOLD and P. J. KEARNS. *Amer. J. Obstet. Gynec.*, **52**, 840–844, November 1946. 3 figs., 22 refs.

201. **A Review of One Hundred Cases of Ovarian Cancer.**

By E. V. HELSEL. *Amer. J. Obstet. Gynec.*, **52**, 435–439, September 1946. 13 refs.

The author reviews 100 cases of ovarian cancer treated from 1929 to 1943. There were 62 papillary cystadeno-carcinomata, 7 pseudomucinous cystadenocarcinomata, 6 granulosa-cell tumours, 8 secondary adenocarcinomata, 5 solid carcinomata, 6 sarcomata of various types, 1 malignant teratoma, 1 leuteoma, 1 Krukenberg tumour, and 3 unclassified tumours. In addition to the ovarian malignancy there were found 11 fibroid uteri, 1 fibroma of the opposite ovary, 12 cases of pelvic infection and 1 of appendicitis, 10 ovarian cysts, 3 pelvic endometriomata, and 1 retained doughnut pessary.

The gross appearance of ovarian cancer is bewildering. An attempt to classify such tumours as solid or cystic is unsatisfactory, as many are mixed. In this series the majority appeared to arise from papillary cystadenomata. Solid primary cancer of the ovary is rare if sarcomata are excluded. As the growth usually spreads by implantation and contiguity distant metastases were found in a small percentage only. At operation about half the patients had ascites. The average age was 47 years, with extremes at 19 and 75 while 63 per cent of the patients were between 40 and 60 years. Menstrual disturbance, mainly metrorrhagia, was present in 29 per cent, while 56 per cent had had a normal menopause. Twenty-four patients were single and 76 married. Only 75 per cent of the married women had borne children, while 18 per cent had aborted. The insidious onset is illustrated by the fact that while 18 per cent were examined within 1 month and 31 per cent within 2 months of appearance of their first symptom, 68 per cent were considered incurable at the first examination. Unfortunately many considered their abdominal enlargement to be due merely to fat. In 65 cases traced, 19 had had an operation plus irradiation, 39 had had operation alone, 2 had had irradiation alone, while 5 had received no treatment. The average survival time was: after operation plus irradiation, 35.3 months; after operation alone, 11.7 months; after irradiation alone, 1.5 months; and after no treatment, 2.5 months.

Histological grading is said to be of little importance in prognosis. All carcinomata primary in the ovary were placed in 3 grades. Grade 1 tumours (least malignant) showed good glandular formation with well differentiated columnar epithelium; a mature type of structure was maintained throughout, except in areas where early malignant changes were going on, such as piling up of epithelium or invasion of the stroma. In Grade II (moderate malignancy), glandular and papillary structures were still present but were poorly differentiated; there were moderate variations in size and shape of cells, nuclear changes, and more extensive invasion. Grade III tumours (most malignant) showed practically solid carcinoma with little evidence of glandular or papillary structure. It is not stated how many tumours were so classified. Study of a small group of patients, all in an unstated age group, gave these inconclusive figures of average survival time: grade I, 37.6 months; grade II, 12 months; grade III, 26.3 months. Clinical grouping is considered of more importance. A group I tumour is completely removable, and there is no gross involvement of any other structure at the time of operation. A group II tumour is completely removable, but shows removable adhesions to or involvement of other structures. A group III tumour is only partly removable because of extension to nearby structures. A group IV tumour is irremovable because of extensive involvement of adjacent parts or distant metastases. Immediate mortality (within 2 weeks of operation) was 17 per cent: 1 (group I), 1 (group II), 11 (group III), and 4 (group IV). This explains why so many

patients received no irradiation. Two tables show survival times ranging from 38 months in group I tumours to 5½ months in group IV tumours. Post-operative irradiation, in general, increases the comfort and improves the psychological state of the patient. It appreciably prolongs the survival time, but its curative value is discouragingly low.

Anthony W. Purdie

202. **Carcinoma of the Ovary.** (Beitrag zur Klinik und Therapie der Ovarialcarcinome.)
By K. Abt. *Gynaecologia, Basel,* **122**, 140–168, September 1946. 11 figs., 32 refs.

The clinical features, symptomatology, diagnosis, and treatment of 184 cases of carcinoma of the ovary are described and discussed. Diagnosis is not easy, and in many cases errors were made. Only in 21 per cent was a correct diagnosis made by the patient's own doctor. Cysts or tumours of the ovary were diagnosed in 35 per cent, tumours of the uterus in 18 per cent, abdominal tumours in 10.5 per cent. Other patients were referred for menorrhagia or considered to be suffering from colitis, appendicitis, or ectopic gestation. In hospital 34.3 per cent were diagnosed correctly. Care was taken at operation to establish the diagnosis of malignancy, by immediate opening of the specimen and inspection of the opposite appendages, pelvic peritoneum, and lymph-nodes. The distribution of the cases into various groups and the methods of treatment adopted are described. Radical removal of the uterus and appendages was performed as early as possible, and this applied also to cases with metastasis. The results in cases treated by post-operative irradiation were much superior to those where no irradiation was given. About 20 per cent of the patients were cured 5 years after treatment. The author points out that every fifth ovarian tumour is a carcinoma. The diagnosis of malignancy may be difficult and may depend on a careful assessment of clinical and pathological findings.

[This is useful work on a gynaecological problem which often proves distressing. It is hard to feel satisfied with a 5-year cure rate of only 20 per cent in spite of the best treatment. This figure emphasizes the need for early diagnosis and treatment.]

Josephine Barnes

203. **Arrhenoblastoma of the Ovary, with a Report of Two Cases.**
By G. S. Jones and H. S. Everett. *Amer. J. Obstet. Gynec.*, **52**, 614–622, October 1946. 7 figs., 21 refs.

These 2 cases of arrhenoblastoma were studied in the Johns Hopkins Hospital. The first patient, aged 36, was first seen in November 1944, complaining of vaginal spotting every 2 weeks. When 15 years old, she had noticed a fine growth of hair on the upper lip, chin, and cheeks. At the same time her breasts began to develop, and though this development continued normally no menses appeared. At the age of 18 menstruation finally began; the periods were irregular and the flow was scanty and lasted 1 or 2 days. After the patient married at the age of 23 the menstrual interval decreased somewhat and varied from 1 to 3 months, but the amount was unchanged. She never became pregnant though she did not practise contraception. Two months before she was first admitted to hospital slight vaginal bleeding had begun to appear every 2 weeks and a curettage was done in consequence. On examination under anaesthesia it was thought that the uterus contained a small myoma. Microscopical examination of the curettings revealed early proliferative endometrium. The spotting continued at intervals of about 2 weeks until April 1945, when the menses ceased entirely. She was re-admitted to hospital in August 1945, and was then found to be a somewhat obese woman—the obesity being limited to the trunk, the arms and legs being relatively small and muscular. There was hypertrichosis of the cheeks, lips, chin, and chest, masculine distribution of the abdominal and pubic hair, and marked hypertrichosis of the lower back, buttocks, and thighs. The breasts were well developed and pendulous in type. Blood-pressure was 176/96 mm. Hg. On abdominal examination an ill-defined mass could be felt in the left lower quadrant.

On pelvic examination the labia majora were found to be small and the labia minora almost absent. The clitoris was not enlarged. The body of the uterus was small and a mass was found in the right adnexal region. At operation the uterus, Fallopian tubes, and left ovary appeared normal. The right ovary was replaced by a solid tumour 9 cm. in diameter with a purplish-brown corru-

gated surface. There was no evidence of metastases. Total hysterectomy was performed, both Fallopian tubes and ovaries being removed.

Pathological examination showed a normal uterus and patent Fallopian tubes. The right ovary was replaced by the tumour, which was apparently solid and well encapsulated with a smooth surface. It was yellowish-grey in colour and on section had a rubbery consistency and was separated into lobules by white fibrous tissue. Microscopically the tumour was composed almost entirely of well-differentiated tubular elements with very few interstitial cells. The authors consider that the tumour was an arrhenoblastoma with relatively slight masculinizing tendency. The presence of sex abnormalities since puberty might indicate a congenital abnormality of the sex ridge with much later tumour formation. It would seem that the paucity of masculinizing symptoms is related to the scarcity of the interstitial cells of the tumour. This fact has been found to be generally true of the Pick type of tumours.

The second patient, aged 26, first seen in December 1944, complained of menstrual irregularity of 3 years' duration. Menses had started at 12, and until the start of the present trouble had been regular and painless with average loss. She had been married 2½ years but had not become pregnant. When first seen she had had 5 months' amenorrhoea; immediately before that there had been 10 months' amenorrhoea followed by 3 months in which periods were regular and normal. It was noticed at the first examination that the patient's voice was slightly husky and that there was some hirsutism on face, arms and legs, while the pubic hair extended to the umbilicus. The breasts appeared normal. The clitoris was enlarged—2 cm. long by 1.5 cm. in diameter. There was bleeding; the uterus was normal in size and position; the left ovary was normal, but the right was about 2¼ times the normal size, firm, and freely movable. A primary determination on a 48-hour specimen showed no pregnandiol. Examination for 17-ketosteroids in two 24-hour urine specimens showed 56 and 36 mg. per 24 hours. Operation on January 2, 1945, revealed a normal uterus and Fallopian tubes. The left ovary was slightly smaller than normal and adherent to the posterior surface of the broad ligament. The right ovary was converted into a small spherical tumour about 5 cm. in diameter, also bound to the posterior surface of the broad ligament by filmy adhesions. A right salpingo-oöphorectomy was done.

On section the tumour was found to be solid, well-encapsulated, and of soft consistency with a mottled surface of yellow and reddish areas. Microscopically, it was composed almost entirely of interstitial cell elements, large masses of cells with eosin-staining cytoplasm and small hyperchromatic nuclei. These cell masses were interspersed with areas of small spindle cells, which in certain parts could be seen to differentiate into tubular-like structures. Because of the relatively poor development of the tubular elements in the tumour, it was classified as an arrhenoblastoma of the intermediate cell type. Twelve days after operation, the 17-ketosteroid level had fallen to 11 mg. in 24 hours. When last seen, on October 31, menstruation was normal and regular at intervals of 22 to 27 days, and lasting for 4 days. The clitoris was now only 1 cm. long and of 0.7 cm. diameter, but there was no improvement in the hirsutism or voice.

The question of the malignancy of arrhenoblastomata is discussed by the authors. Only about 65 cases have been reported up to date, and in many the follow-up studies are unsatisfactory. The majority of cases appear to be benign, so that a simple oöphorectomy seems advisable, especially as many of the tumours are in young women.

F. J. Browne

204. **Granulosa-Cell Tumour of the Ovary.**
By J. J. Bianco and G. O. Favorite. *Amer. J. Obstet. Gynec.*, **52**, 677–680, October 1946. 2 figs., 11 refs.

The literature reveals but a few cases of granulosa-cell tumour in which the diagnosis was made pre-operatively. Half the cases occur during child-bearing age, 5 to 10 per cent before puberty, and the rest after the menopause. In children the symptoms are mainly those of precocious menstruation and somatic development. Amenorrhoea, menorrhagia, or metrorrhagia may be met with during the child-bearing period and after the menopause, but cyclic bleeding is the most common symptom. According to Dockerty, amenorrhea may

be the first symptom. Oestrogens are present in excess in blood and tumour tissue, and this excess is the cause of the symptoms.

The naked eye appearances of the tumour vary considerably. The diameter may be a few millimetres or it may be large enough to fill the abdomen. On section it may be solid or cystic and it is often associated with cysts of the ovary. The yellowish colour of the cut surface is characteristic and helps to distinguish it. In 10 per cent of cases the tumour is bilateral. The histological appearances are also varied, folliculoid, cylindromatous, pseudo-adenomatous, and parenchymatous types being described. In the authors' case a woman, aged 55, 2-para, began to have climacteric symptoms in 1942. In May 1944, the periods ceased, but in February 1945, after 9 months' amenorrhoea, intermittent vaginal bleeding set in with soreness of the breasts, a tender abdominal swelling, and other symptoms suggesting pregnancy. In March 1945, while lying on her abdomen and reaching for a toy under the sofa, she had a sudden severe pain in the right upper quadrant of the abdomen and right shoulder. On examination a cystic semi-solid tumour the size of an orange was found in the left appendage. From the history and examination the diagnosis of granulosa-cell tumour was made. At operation the abdominal cavity was found to contain about 2 litres of serosanguineous fluid, the origin of which was apparently a large collapsed cyst, which was attached to a multilocular mass in the left appendage. The uterus and the tubo-ovarian mass were removed, the right ovary having been removed when the patient was 17 years old. The tumour was partly solid and partly cystic, the solid portion being intensely yellow. Microscopical examination revealed a granulosa-cell tumour of the cylindromatous type with hyperchromatic nuclei but few mitoses. Sections from the wall of the collapsed cyst showed a wide zone of granulosa cells of similar pattern. The myometrium presented no distinctive features. The endometrial picture is described as "compatible with that described by others in connection with granulosa-cell tumours", but no further details are given. The patient was alive and well 1 year after operation.

F. J. Browne

205. **Post-menopausal Haemorrhage and Malignant Tumours of the Ovary.** (Metrorragie postclimateriche e tumori maligni dell'ovaio. La metrorragia come sintoma precoce.)

By G. NIOSI-CUISMANO. *Riv. ital. Ginec.*, **28**, 264–300, July-December, 1945. 9 figs., 57 refs.

Post-menopausal haemorrhage is defined as haemorrhage occurring after amenorrhoea for at least a year in the period when the menopause usually occurs and when general signs of the menopause have been present. The literature shows that post-menopausal haemorrhage is an early sign of ovarian carcinoma and that its source is hyperplastic endometrium. The cause of the hyperplasia is probably folliculin, produced by stimuli from the affected ovary, and perhaps acting indirectly through the pituitary.

Three cases of post-menopausal haemorrhage are reported, the patients having passed the menopause from 3 to 13 years before its occurrence. In each case the haemorrhage was the earliest sign of an ovarian carcinoma. The histological diagnoses on specimens removed by operation were: (1) cystadenocarcinoma, (2) bilateral papilliferous cystadenocarcinoma, and (3) proliferating adeno-cystoma with signs of malignancy. The patient with the third diagnosis later developed an adenocarcinoma of the corpus uteri, considered to be independent of the ovarian tumour and due to malignant change in the hyperplastic endometrium. Since post-menopausal haemorrhage from hyperplastic endometrium is often due to causes other than ovarian carcinomata, immediate laparotomy is not justifiable, but the patient should be frequently examined (say once a fortnight) in case enlargement of the ovary should occur. When operation is indicated the abdominal route is usual, but the vaginal route may sometimes be preferable. A good review of the literature is given.

Raymond Whitehead

206. **Ovarian Tumors.**

By F. B. BLOCK. *Amer. J. med. Sci.*, **212**, 738–754, December 1946. 27 refs.

207. **On the Origin of Certain Perisalpingeal Cysts.**

By R. A. REIS. *Amer. J. Obstet. Gynec.*, **52**, 964–974, December 1946. 12 figs., 8 refs.

208. **Neoplasms of the Broad Ligament.** (Le neoplasie del legamento largo. Rivista sintetico-critica con contributo personale di tre casi.)

By L. NOBILI. *Riv. ital. Ginec.*, **28**, 312–341, July–December 1945. 7 figs., 129 refs.

Benign connective-tissue tumours of the broad ligament are relatively rare, the most frequent type being the fibroma. Primary sarcomata are very rare, and of the recorded cases the diagnosis in 24 (including 3 here described) was certain and in 19 doubtful. Published statistics are discordant, since they include tumours that were not primary and tumours with inadequate histological diagnosis. Primary sarcomata may occur at any age, but are most usual between the ages of 30 and 50 and are slightly commoner on the right side. They vary in size from that of an orange to that of an adult human head; they are usually regular and rounded or oval, with a smooth or finely nodular surface, and firm and elastic. Almost all histological types have been described, including (in order of decreasing frequency) pure sarcoma, fibrosarcoma, chondrosarcoma, myoma sarcomatoides, telangiectatic-haemorrhagic sarcoma, pseudocystic myoma with fibromyosarcomatous degeneration, and fibroreticulosarcoma.

The author's cases consisted of (1) a fibromyxosarcoma diagnosed clinically as an ovarian cyst, (2) a fibroreticulosarcoma (first recorded case) diagnosed clinically as an ovarian tumour, and (3) a fibrosarcoma diagnosed clinically as a solid tumour of the right parametrium. None showed metastases and all were cured by operation. Metastases were noted in 7 of the 24 cases considered certain in the literature; there was no site of predilection. There is no characteristic symptomatology, the best guide to diagnosis being the finding on vaginal examination of a tumour with only slight mobility not connected with the uterus, which is displaced upwards and sideways, with lengthening of the vagina so that the cervix is out of reach of the examiner's finger. The treatmen is early removal of the tumour and if necessary of the uterus and adnexa.

[This is a comprehensive and well-written review.]

Raymond Whitehead

Operations.

209. **Absorbable (Oxidized) Gauze as a Hemostatic Agent in Gynecologic Surgery.**

By W. E. STUDDIFORD. *Amer. J. Obstet. Gynec.*, **52**, 495–499, September 1946. 1 fig., 10 refs.

Fibrin foam, gelatin sponge, and oxidized cellulose have been studied recently as haemostatic agents. With the two former thrombin solution is necessary for haemostasis, but oxidized cellulose is a haemostatic agent in its own right, which makes its use simpler. Kenyon *et al* (*J. Amer. chem. Soc.*, 1942, **64**, 121) found that cellulose in any form—paper, cotton, or gauze—could be oxidized by nitrogen dioxide. By extensive carboxyl formation the original qualities of the material are altered. Shrinkage occurs, some tensile strength is lost, and the material becomes rather yellow. Shrinkage can be minimized by oxidation of the gauze on stretchers. Its most important quality from a surgical point of view lies in its low solubility in a 0.15 molar solution of sodium bicarbonate, the pH of which approximates to that of blood. Its main disadvantage is that it disintegrates in the autoclave and only withstands boiling for 3 minutes. It is sterilized by formaldehyde.

The response of animal tissues to all these forms of oxidised cellulose, and especially to the gauze, has been studied. The gauze has been implanted into a large variety of animal tissues, including parenchymatous organs. It is relatively non-irritating, produces little reaction, and is eventually completely absorbed. The time of absorption depends on the amount of material introduced, the extent of the operative trauma, and the quantity of blood present in the gauze. Oxidized cellulose appears to have a specific affinity for haemoglobin, absorbing it from solution, and forming a chemical combination which turns the gauze brown. In contact with whole blood it rapidly forms a brownish-black gelatinous mass; its bulk increases during this process. These changes account for its haemostatic qualities. It will control free bleeding from experimental lacerations of liver, kidney, and spleen. The implanted material goes slowly into solution and is excreted from the blood stream mainly by the kidneys. Some of the material is carried away by phagocytes not as particulate matter but in solution, causing intense basophilic

staining of their cytoplasm. Its passage does not appear to cause any significant kidney damage. In serous and synovial cavities thin-walled non-inflammatory cysts may form about the gauze. These probably eventually disappear.

The author reports its application in 30 cases to control haemorrhage from various sites. In 15 abdominal operations absorbable gauze was used to control bleeding from raw surfaces: (1) of pelvic peritoneum after removal of adherent adnexal masses (9 cases); (2) in retroperitoneal bleeding (4 cases); (3) in secondary abdominal pregnancy after accidental attachment of the placental margin (1 case); and (4) in oozing from a stitched myomectomy wound (1 case). Two deaths, in no way attributable to the use of absorbable gauze, occurred. It was also used in 15 vaginal operations as follows:

1. To control bleeding at operation (7 cases). This comprised: (*a*) Oozing at the end of a plastic operation in 4 cases of which 2 were successful and 2 were failures; in the latter, plain gauze should have been placed on top of the absorbable gauze to effect pressure. (*b*) Profuse bleeding during dissection of prevesical fascia in a plastic operation (1 case). Absorbable gauze was packed against the bleeding area and bleeding stopped. Fascia was united in the midline and the vaginal wall was closed over it. Convalescence was uneventful, and healing perfect. (*c*) Bleeding from the crater of a carcinomatous cervix (1 case), and from a biopsy wound difficult to suture (1 case) was promptly stopped by application of absorbable gauze with superimposed vaginal packing.

2. To control secondary haemorrhage from the vagina in: (*a*) Three cases after vaginal plastic operations where haemorrhage was due to disruption of the vaginal vault. Under anaesthesia one or more squares of absorbable gauze were placed against the bleeding areas and the gauze was supported by plain packing. The absorbable gauze was discharged as brownish particles over the next 7 to 10 days. The efficacy of these repairs was in no way adversely affected. (*b*) Three cases of serious haemorrhage from a disrupted vaginal vault after total abdominal hysterectomy; the results were equally good with this treatment. (*c*) Haemorrhage on the third day after cauterization of a cervix (1 case), and on the seventh post-operative day after a biopsy of cervix (1 case). The haemorrhage was in each case similarly controlled.

Absorbable gauze in no sense replaces careful control of haemorrhage by clamp and ligature. Haemorrhage from raw oozing areas is best controlled by applications of absorbable gauze followed by momentary digital pressure. In a few cases it has to be held in position by ordinary packing. This latter can be removed without fear of recurrence. It appears to be harmless even when used in closed cavities.

Anthony W. Purdie

210. **A New Method of Preventing Tubal Occlusion following Operations for Sterility.** [In English.] By A. WESTMAN. *Gynaecologia, Basel*, **122**, 133–139, September 1946. 3 figs., 5 refs.

Results of operations to relieve occlusion of the Fallopian tubes are not encouraging. The reasons for failure are a flare-up of inflammation of the tubes after operation resulting in adhesions and damage to the muscular walls of the tubes; there is also the fact that the newly formed ostium tends to grow together after operation. The author describes a new method of salpingostomy in which a plug of cholesterol oxalate, a substance normally present in the adrenals, is inserted into the new abdominal ostium. This substance has a melting-point between 39° and 40°C., is non-irritating, and is easily absorbed. The plugs were at first melted after operation by means of short-wave diathermy, but later it was found that the intravenous injection of 1 to 1.5 ml. of a vaccine of *Bacillus aerogenes faecalis*, previously sterilized with formol, gave better results. The body temperature rose to 40°C. and remained there for a few hours. The time of melting was at first 7 to 14 days after operation, but inflammation occurred despite penicillin therapy. Melting is now performed 1 month or more after operation, and when the plug has been melted the tubes are washed out with penicillin solution while penicillin is also given intramuscularly. It is not possible to give long-term results, but judging by present achievements it would seem that this method is an improvement on older ones. In 51 cases operated on 35 showed a communication between the tube and the abdominal cavity, but the results as regards the occurrence of pregnancy cannot as yet be assessed.

[This may prove to be a useful method of dealing with a difficult problem, though the technique seems very elaborate and the incidence of inflammatory reactions high. Long-term results must be awaited before this can claim to be an improvement on older methods.]

Josephine Barnes

211. **Ligamentopexy.** (La ligamentopexie croisée.) By E. NEGRE. *Presse méd.*, **54**, 757, November 9, 1946. 2 figs.

After ventrosuspension by the method of Doleris there is a risk of incarceration of the small intestine, and the object of the author's technique is to avoid this. In his operation the round ligaments are detached and crossed over each other. The distal ends are sutured to the parietal peritoneum, thus obliterating the lateral peritoneal pouch. It is claimed that this procedure eliminates all danger of intestinal occlusion by forming a pelvic diaphragm at the level of the uterus, while maintaining the necessary uterine mobility to allow of enlargement in pregnancy. It also eliminates all possibility of incarceration of the Fallopian tube, as well as the risk of formation of adhesions between the round ligaments and the peritoneum, thus avoiding possible trouble in menstruation and pregnancy, and urinary difficulties and infection.

[This is another addition to the already numerous operations for retroversion. It seems a reasonable procedure, though in the absence of case records of operative results no assessment of the value of this new technique can be made.]

Josephine Barnes

212. **A Modification of Alexander-Adams Operative Technique.** [In English.] By A. M. Ritala. *Acta Obstet. Gynec. scand.*, **26**, 598–603, 1946. 10 figs., 11 refs.

See also No. 132.

Urology.

213. **Unrecognized Vesical-neck Obstruction in Women.** By C. E. JACOBSON. *New Engl. J. Med.*, **235**, 645–648, October 31, 1946. 3 figs., 6 refs.

With the object of drawing attention to vesical-neck obstruction again and urging early treatment the author presents 3 cases in women. The author summarizes the condition by saying that it occurs in elderly women and appears to correspond to the "*prostatisme sans prostate*" of men. The aetiology is unknown, though there are various theories. The symptoms are the same as in men, and consist in difficulty in urination, urgency, diurnal and nocturnal frequency, and sometimes haematuria. Neurological and gynaecological causes of these symptoms should be excluded. The indications of vesical-neck obstruction are the presence of residual urine and trabeculation of the bladder, sometimes with formation of diverticula and sometimes with cystoscopic changes in the bladder neck. While the author advocates its early diagnosis, he also points out that it is almost impossible to recognize in an early stage. The ideal treatment is resection of the vesical neck, but partial resection is often enough. A sphincterotomy or incision of the posterior vesical lip is helpful but of temporary benefit only.

[The cases are not well described, and it is impossible to gain any idea of the effect of treatment. For example, in case 1, it is stated that after operation "residual urine gradually diminished and within 2 weeks all symptoms had subsided". Such is the entire information given about the later history of this patient who had had urinary symptoms all her life.]

L. W. Lauste

214. **The Disorders of Micturition.** By H. H. SCHLINK. *Med. J. Aust.*, **2**, 512–516, October 12, 1946.

This is a discussion of urological disorders commonly seen in gynaecological practice. Each is briefly described, and the section on urinary fistulae is detailed and particularly helpful. Types of inflammation and their sequelae are first discussed and stress is laid on the frequency of urethritis. Abscesses of Skene's glands are an example of periurethral inflammation—a condition which may lead to stricture. Atrophic lesions round the meatus with accompanying urethritis after the menopause are best treated by oestrogens. In dealing with inflammation of the bladder, a warning is given about excluding and treating any associated pelvic inflammation; the converse is

also true. Among secondary infections due to the presence of residual urine resulting from cystocele and prolapse and those associated with chronic cervicitis, trigonitis is not uncommon.

In dealing with carcinoma of the urethra the author advises interstitial radium locally and deep X-ray therapy to the inguinal glands. The prognosis is poor, Crossen's figures showing 11 out of 25 cases alive after 2 years. In dealing with carcinoma of the base of the bladder secondary to growth in the cervix, operative excision should be undertaken—as in endometriosis, in which the lesion has to penetrate peritoneum and bladder wall before reaching the mucosa.

Retention of urine of psychological origin may respond to acetyl β-methyl choline bromide in oral doses of 0.2 g. 3 times a day; other cases require correction of the gynaecological abnormality causing them. In long-standing cases of prolapse pre-operative lavage of the bladder is useful and, where catheterization is prolonged or an indwelling catheter is used, 6 to 12 g. of ammonium or calcium mandelate daily is said to prevent infection, encrustations, and clogging of the catheter. Stress incontinence is really a gynaecological problem, usually curable by colporrhaphy; in many cases a proper union of the levatores ani is needed as a support to the elevated bladder and repaired sphincter.

Urinary fistulae are discussed in the last part of the paper, emphasis being laid in the first place on distinguishing between incontinence due to pin-point fistula of the bladder, to impaired sphincter mechanism, and to uretero-vaginal fistula. A gauze plug in the vagina and instillation of coloured fluid into the bladder will allow of a distinction between the two types of fistula. Treatment should often be preceded by cystoscopy to study details of the problem; indwelling ureteric catheters at operation may be of the greatest value. At least 6 months should be allowed to elapse after the appearance of a fistula or after its attempted repair before a second operation is undertaken. Cases suitable for immediate repair are naturally excluded. The transperitoneal approach is recommended for high fistulae, but the transvesical approach, in the author's view, is always bad. A vaginal cystotomy well above the fistula may be better than post-operative catheter drainage in vesico-urethro-vaginal fistula, but urethro-vaginal fistulae may be closed over a catheter. The nearer they are to the vesical sphincter the more difficult they are to cure, but bad results are often due to post-operative mismanagement. A case is quoted in which a vulsellum clamped on the anterior lip of the cervix during curettage produced a tear of the bladder, which was repaired later by an approach from below.

Lastly, injury to the ureter is mentioned and reference made to the value of Frecker's instrument in re-implantation of the ureter. All operations for the cure of urinary fistulae should be followed by insertion of an indwelling urethral catheter from 10 to 14 days, and an indwelling uteric catheter may likewise be helpful in dealing with ureteric injuries. In cases where ligation of the ureter has to be carried out, atrophy of the kidney is usual but nephrectomy may not be necessary for a long time.

Guy Blackburn

215. **Disorders of Micturition in the Female.** By A. B. Walker-Smith. *Med. J. Aust.*, 2, 516–519, October 12, 1946.

Abacterial cystitis often starts as a mild urethritis but has been known to develop into one of the most distressing of all vesical conditions. In certain instances arsenic has no effect whatever, but some of these patients have responded well to penicillin therapy. Chronic urethritis, likewise, causes much distress and disability and the aetiology is obscure. Half of the cases show a cystitis and trigonitis on cystoscopy, and in others there is a structure at the bladder neck resembling the median prostatic bar in the male. Instillation of 5 per cent argyrol (argent. protein. mitis), urethral dilatation, and in some cases light diathermy to the bladder neck are useful forms of treatment.

Inflammatory stricture is commoner than the traumatic type, and after-dribbling is a more frequent symptom than dysuria. Residual urine is rarely found. Treatment is by gradual dilatation, and the tendency for the stricture to contract is not so pronounced in the female as in the male. The condition, when it occurs in elderly women, is probably due to atrophic changes, but response to treatment is equally satisfactory.

Urethral diverticula are rare but can be demon-

strated by urethrography. Radical excision is the treatment of choice, with an indwelling urethral catheter for 10 days after operation. Prolapse of the urethra is likewise rare and, if reposition and insertion of an indwelling catheter are not efficacious, operation should be undertaken. In this case it is advisable to insert stay-sutures before cutting the prolapse away, as the mucosa may otherwise slide up the urethra and stricture result. Diathermy is recommended for urethral caruncle, with insertion of a post-operative catheter for 2 to 3 days and subsequent dilatation to prevent stricture. Lastly, brief mention is made of chronic interstitial cystitis and trigonitis, the latter usually being associated with disease in the generative tract.

Guy Blackburn

See also No. 140.